Agriculture Department,

Central Provinces,

report,

1910-11 to 1914-15

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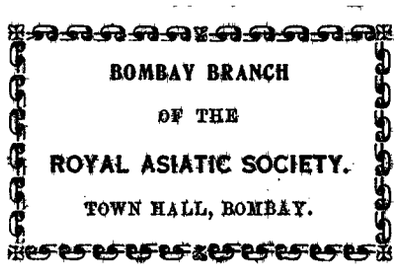

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DEPARTMENT OF AGRICULTURE

OF THE

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CENTRAL PROVINCES

FOR THE YEAR

1910-11

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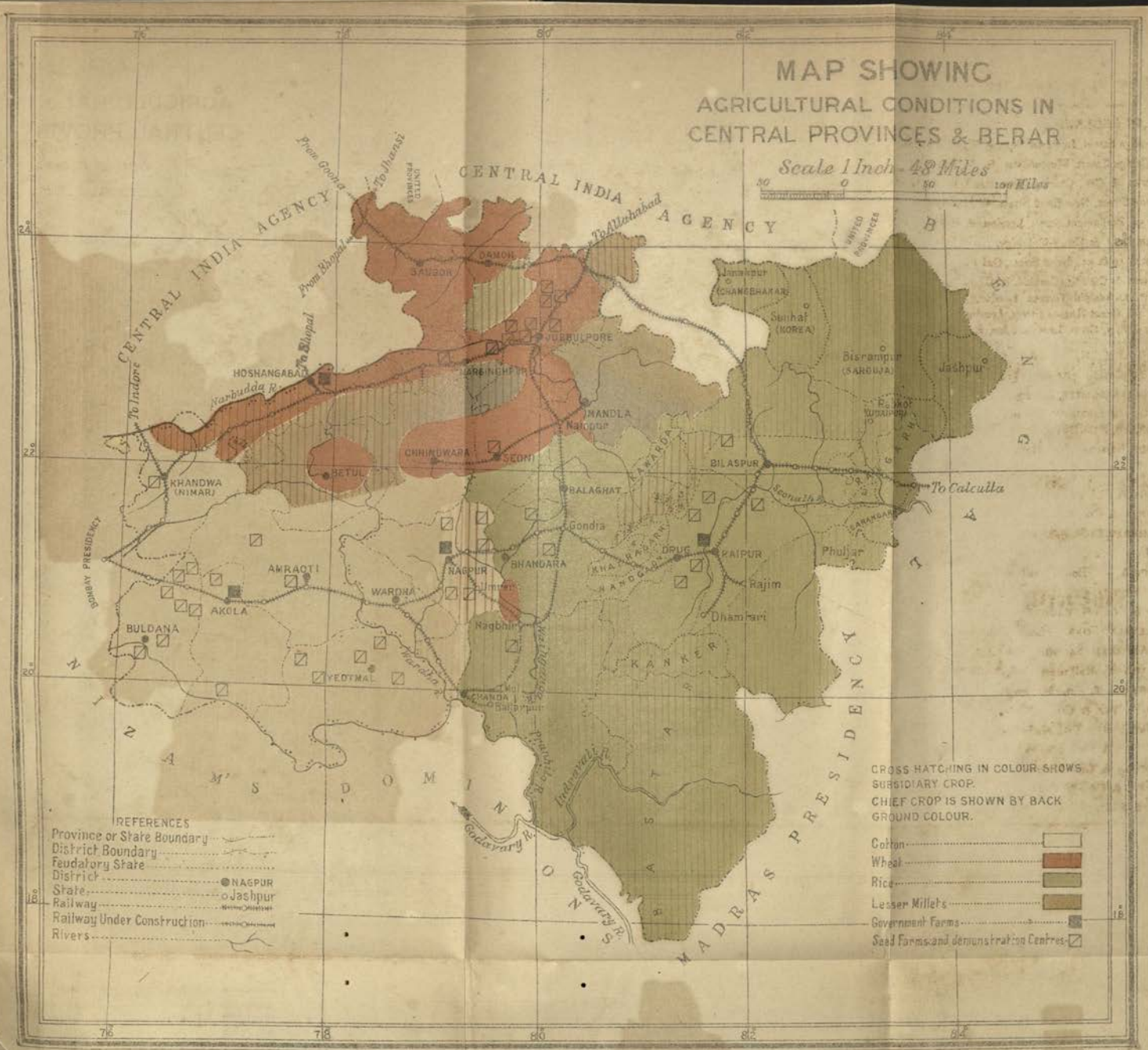

Printed at Office of Superintendent Govt. Printing Nagpur C.P.

No. 558
XIII-18-19.

CENTRAL PROVINCES ADMINISTRATION.

Agriculture Department.

Nagpur, the 15th November 1911.

READ—

Report on the Department of Agriculture, Central Provinces, for the year ending 30th June 1911.

RESOLUTION.

The staff of the Imperial Service remained unchanged, but during the year two officers were absent on short leave. Temporary arrangements to carry on their work were made, and it will generally be possible to do so in such cases; but as time goes on the European Officers of the Imperial Service will become entitled to long leave, and on grounds of health ought not to be debarred from taking it. During absences of more than three months with the present staff local arrangements will entail serious loss of efficiency, and the provision of a suitable leave reserve is an urgent need. This will necessitate some increase in the staff, but apart from a leave reserve, the field of work open to the Department, both in experiment and demonstration, is expanding so rapidly that the appointment of a third Deputy Director of Agriculture to relieve Mr. Clouston in the Southern Circle of part of his charge cannot be deferred much longer. The Southern Circle includes the important rice areas of Chhattisgarh and the Wainganga, the cotton and juar tract of Nagpur and Berar, and the areas commanded by the most important Government irrigation works, where alone the growing of sugarcane on a large scale can be looked for. The Deputy Director of this Circle has thus to deal with three main crops, all demanding experiment and demonstration, and though Mr. Clouston has been able to control this work hitherto, it is increasing so rapidly as to become more than he can manage. Considering the great importance of active demonstration of the best methods of using irrigation, and of creating a demand for water, such an appointment will have a most important bearing on the financial success of Government irrigation works. The creation of a Provincial Service, and the division of the subordinate service into an upper and lower service, will do much to improve the prospects of the members of the Agricultural Department and should encourage the recruitment of suitable candidates and enable the work to be extended to the many areas where demonstration is urgently required and has not been taken up for want of men.

2. The College made good progress during the year, but the teaching is still hampered for want of the laboratory accommodation, which will shortly be made available, and the suitable class-rooms which cannot be provided until the laboratory is moved from its present position. The Nagpur Farm, which was formerly the sole experimental farm of the Provinces, has now been adapted to instructional purposes, and forms a most useful adjunct to the College, and the proposal to attach a small instructional dairy to this farm, will serve to interest the students in the practical management of live-stock. The grant of the degree of L. Ag. to men passing in the first class has had a marked effect on the keenness of the students, and it is satisfactory to note that four men have gained this degree. The Chief Commissioner notes with satisfaction the high standard maintained by the College, and he considers that Mr. Allan and his colleagues are to be congratulated on the work of the year. Every effort must, however,

be made to attract to it as many students as possible of the agricultural castes. The course should not be allowed to degenerate into a cheap and easy entrance for the literary classes into Government service. While fully recognising that some of the best members of the department belong to these classes, there can be no doubt that men of agricultural castes are on the whole better fitted to stand the hard work in the fields entailed by demonstration, and efforts should be made to obtain students of these castes. Few boys, the sons of agriculturists, at present, go to the High Schools, and no boy who has not passed the Matriculation Examination can derive much benefit from study at the College. The difficulty of securing students of these classes can only be removed by offering inducements to them to enter the High Schools as a preliminary step to the Agricultural College. The ma'guzari class attached to the Nagpur Farm has now been closed and replaced by more practical courses on other farms in the Province. The instruction given is intended to teach certain definite practical items of agriculture of local importance and is made suitable to agriculturists of little or no education, and the courses prescribed fit them for employment not only in the work of demonstration conducted by the Department, but also as kamdars for the Court of Wards and for private persons who require men to look after cultivation.

3. Excluding the Nagpur Farm, which, as noted above, has now been made an adjunct to the College, there were four experimental farms working during the year. Arrangements have been made for starting two new farms, one near Jubbulpore for experiments in the cultivation of the Jubbulpore tract, and one at Tharsa in the area commanded by the Ramtek irrigation work to ascertain and demonstrate the best system of cultivation in that large irrigated area. Proposals have also been sanctioned for the opening of a farm in the Chanda district to deal with the problems of agriculture arising from the presence of the new irrigation works. When these three farms are in full working order, the only area still requiring a farm for the investigation of local problems will be the Satpura plateau, and this will have to be provided for as soon as staff is available.

4. A review of the year's work necessarily divides itself according to the main crops dealt with on the farms and by the demonstration staff. The most important work in connection with rice was the demonstration of rice-transplanting in Chhattisgarh where broadcasting has been hitherto practically universal. The Department succeeded in raising the area transplanted to 6,000 acres,—a considerable advance in view of the restricted nature of the agency at its disposal, but far too little to overtake the enormous extension in irrigation which the next few years will bring; and the Chief Commissioner desires the Director of Agriculture to consider whether some further means cannot be devised for accelerating progress. The value of bone-dust manure in rice cultivation has been proved in past years, and it is most satisfactory to note that as a result of the experiments made by the Department a private firm has set up a bone-crushing factory at Raipur. If the cultivators of Chhattisgarh be induced to purchase and use this manure on a large scale, a considerable improvement in the rice yields of that part of the Province will result. In the Wainganga area, where the cultivators had hitherto been considered the best rice growers in the Province, the system of transplanting single seedlings was demonstrated with success. Experiments were continued to discover the manures most suitable for sugarcane and the varieties best suited for local requirements, and the problem of the best system of culture for this crop is now being dealt with. The most important manures found so far are oil-cake, *mahua* refuse and ammonium sulphate. The rapid extension of irrigation in this Province has now made the growing of sugarcane a feature of importance, and the experiments for improving the outturn of this crop and the demonstration of the results deserve the careful attention of the Department. In regard to cotton, the experiments of the year confirm the view that *rosea* is a better paying crop than *buri*, and that except in a few areas there is a loss to the cultivator who grows the latter. One of the problems before the Department is to find a free yielding cotton suitable for areas which suffer from frost, and this problem has not yet been solved. The Akola Farm, which is mainly devoted to growing cotton seed, has not been able to supply seed for the large number of private cotton

seed farms which have sprung up, and care must be taken to see that the seed issued from those farms does not degenerate owing to the use of their own seed for too long a period. Their work has been very promising and the demand for seed from them so great that no effort should be spared to prevent any falling-off in the type of seed supplied. The most important work undertaken in regard to juar was the demonstration of a better system of cultivation for kharif crops in the Jubbulpore district, and the results obtained were most satisfactory. Experiments were continued in regard to the optimum quantity of water for the irrigation of wheat and a large number of varieties of wheat were under trial on the Hoshangabad Farm. Mr. Evans has succeeded in establishing a large number of seed farms for wheat in the Nerbudda and Jubbulpore Divisions, and the results obtained are promising. Observations were continued on the damage done by white-ants. The damage to rabi crops caused by this pest in most years is far greater than is usually supposed, and it is hoped that some satisfactory method of preventing it will be found. The introduction of yellow *til* on the Hoshangabad Farm has proved a success. It commands a much higher price, but in order to secure its full value, it will be necessary to issue seed to local groups of purchasers so as to concentrate the crop and enable large enough quantities to be brought on the market to secure an adequate price. The work done by Mr. Clouston and Mr. Evans, both in experiment and demonstration, has been most useful and they are to be congratulated on their success.

5. Mr. Graham, the Economic Botanist, continued his work of classifying the different varieties of juar and rice in order to discover the varieties best suited to the different parts of the Province and by selection to improve them. About 600 varieties of rice and 250 varieties of juar were dealt with, but in the case of the latter further complications arose owing to the cross fertilisation that occurred and the difficulty of discovering unit characters. A most useful local flora of the principal plants occurring on the Nagpur and Telinkheri Farms was prepared by him for the use of students.

The work of the Agricultural Chemist, in addition to his teaching at the College, consists of the analysis of soils, manures, etc, for the public. Mr. Plymen has issued a leaflet showing the advantages of chemical analysis, and this will, no doubt, lead to a further increase of this important branch of his work.

6. The experiments in sericulture were continued during the year, but the results have not proved successful owing to the fact that the difficulty of preventing disease is still unsolved. The industry is one of great possibilities, but before any demonstration work can be undertaken further research is necessary.

7. The two cattle-breeding farms at Nagpur and Hoshangabad continued to work well during the year. Both farms made a profit, but the Chief Commissioner agrees with the Director of Agriculture that private enterprise must be enlisted before any great improvement in the local breeds can be looked for. The few farms which Government is able to maintain as breeding centres will not suffice to provide the supply of good stock which is required for the Province.

8. The contract entered into with Messrs. Burn and Company and the arrangements made with local shopkeepers to sell and stock certain types of implements is an important advance in the introduction of improved implements to the public.

9. The Agricultural Associations have continued to do good work, and the experience gained shows that small associations, representing definite areas, with definite problems, suitable for demonstration, were most successful. These bodies are not yet fitted to carry out any experimental work, and they must at present at any rate rely on the Agricultural Department to initiate most of their chief kinds of work. The influence of District Officers in the working of the Agricultural Associations is most marked, and the Chief Commissioner hopes that all Deputy Commissioners will realize the necessity of their taking a direct and personal interest in the work of the associations. The practical measures evolved by the Seoni-Malwa Sub-Association in the Hoshangabad district for destroying wild pig is an example of the uses of these bodies.

10. The *Agricultural Gazette* continued to maintain its popularity and the number issued during the year rose by nearly 200 copies.

11. The Chief Commissioner is glad to hear that the arrangement of the Archæological section of the Nagpur Museum has been completed, and with the appointment of Mr. D'Abreu as Assistant Curator, the work of forming a collection of specimens of the local fauna has been taken in hand. Mr. Craddock shares the hope that the Zoological section will in a few years' time be more worthy of the reputation of the Province for its abundance of animal life.

12. Mr. Hemingway, who held charge of the Department until the middle of October, and Mr. Low, who relieved him, are to be congratulated on the progress made during the year. He has been ably assisted by the two Deputy Directors, Mr Clouston and Mr Evans, and by the other members of the staff, whose keenness and interest in their work the Chief Commissioner has great pleasure in recognising. The aid given by Deputy Commissioners to the Department must not be lost sight of, and the Chief Commissioner desires to acknowledge the interest shown by Messrs. Leftwich, Bell, Gaskin, Mahdi Hassan, C. A. Clarke and Currie in the important work of encouraging improved methods of agriculture.

13. The report affords most interestingreading, and it is impossible to summarise the details of the various activities on which the department is engaged. A determined attempt is being made to raise the agriculture of the Province on to a much higher plane, and although it is only on the threshold of its future development, it has achieved no mean success. The Chief Commissioner feels no doubt that it is working on very sound lines, and that its labours are most warmly appreciated by the people. Its work appeals to all, and requires the co-operation of all. The united and sustained efforts of the officers of the Department, the Irrigation Engineers, the Registrar of Co-operative Credits, and last but by no means least, of District officers are required and are being given. Among Agricultural Associations the enthusiasm for improvement is striking and gratifying. The Administration is most fortunate in its staff of European agricultural experts, while the creation of a new Provincial Agricultural Service will enable the unremitting exertions of the most deserving of the Indian assistants to be suitably recognized and afford a valuable stimulus to the Agricultural College. Under the inspiring energy and leadership of the Director, Mr. Low, further progress and success can be confidently anticipated.

ORDER—Ordered that a copy of this Resolution, together with the enclosure, be submitted to the Government of India, in the Revenue and Agriculture Department, that copies be forwarded to the Director of Agriculture and to all Commissioners and Deputy Commissioners, Central Provinces, for information and guidance, and that it be published in the Supplement to the *Central Provinces Gazette*.

E. A. DE BRETT,

Chief Secretary to the Chief Commissioner,

Central Provinces.

Govt. Press, Nagpur :—No. 1643, Civil Sectt—17-11-11—532.

Report on the working of the Department of Agriculture, Central Provinces, for the year 1910-11.

PART I.—ADMINISTRATION.

Mr. Hemingway held charge of the Department until the middle of October. Since then I have held charge up to the end of the year. Mr. Evans was absent for three months on privilege leave, and Mr. Allan for five weeks. During these short periods it is possible to make arrangements for carrying on the work of absentees, but longer periods of absence would cause a serious interruption to work, and it is to be hoped that sanction to the scheme for replacing members of the superior staff who are absent on leave will not be delayed much longer. Six officials, one from the Agricultural Department of the United Provinces, joined the Department, and three left it, one of whom resigned, not finding the hard work of demonstration in Chhattisgarh to his liking, one was reverted to his original post, as I did not consider him fitted for the work of the Department, while the third had not the physique for demonstration work, though in other ways a desirable recruit. He was provided for in the Land Records Department.

2. The total expenditure during the year was Rs. 3,71,563. A sum of Rs. 2,041 lapsed as unexpended at the end of the year. The receipts were Rs. 62,402.

PART II.—AGRICULTURAL EDUCATION.

3. The fresh arrangement of the farm with a special view to instructional use, alluded to in the last year's report, was brought into working order this year. The special features of the farm now are, firstly, a large series of crop examples, consisting of no less than 285 small plots of different species and varieties, and a series of illustrative plots showing the various methods of cultivation in use in different parts of the Central Provinces. The first and second year students were given practical work on ordinary field crops: the third year were employed on crop management, being allowed the labour and implements necessary for the cultivation of the different crops, and were also employed in practical work on garden crops. Practical agriculture was a very important feature of the year's work; and success or failure therein was given full consideration in determining the final position of the students at the end of the year. Shortly after the end of the year, a beginning was made with the instructional dairy at Lendra. In view of the increasing importance attaching to the feed and care of cattle in the Province, it is necessary to give the students an idea of the proper standard in dairy management, and of the profits that can be obtained from this hitherto neglected branch of agricultural economy.

4. The Public Works Department made satisfactory progress on the new laboratory buildings. Research work of all kinds, as well as teaching, is carried on under great difficulties till these laboratories are completed. The rooms in which the staff lecture are badly lighted and acoustically deficient. The number of students who appeared for the examination in March last was 20 first year men, 14 second year men, and 18 third year men—a total of 52. Out of these 13 were from Bengal; the Sabaur College will henceforward meet the demand for agricultural education in that Province: and the Nagpur College, while still open to all comers, will allow priority to applicants from the Central Provinces and Berar and from Central India States. This will give more room for the expected increase in the number of applicants, and make it possible for the Principal to give some instruction in Revenue Law and Administration, matters which very closely concern men who also have to take their part in the agricultural administration of the Province. The students on the whole were of a good type; and, after one or two of the faint-hearted had recognised their physical unsuitability for hard manual labour on the farm, appeared a healthy, athletic and cheery lot of lads, who were equally at home in the muddy garden plots transplanting tobacco in the morning, in the lecture rooms in the afternoon, or on the hockey field in the evening.

5. Though great importance is attached to the necessity of a practical Agricultural training, it was found that relaxation of the Matriculation test in favour of the sons of cultivators was not a success; of the 12 men in whose favour this experiment was tried, only 3 are remaining in the College, the rest having been weeded out as unlikely to be of use. There are a few agriculturist students who have matriculated, however, and the number will probably increase as the work of the Department becomes more popular and more widely appreciated. But the agricultural castes do not take readily to any form of higher education: and those who do, are more usually divergents from the type, who dislike agriculture and prefer a (so-called) literary career. The few agriculturists, however, who are capable of passing through our agricultural course are the very pick of our recruits. Non-agriculturists pass the examinations more successfully: the difficulty in their case comes when they are tried on practical work. An appeal is being issued through Deputy Commissioners and the Educational Department to the cultivating castes, to avail themselves of the opportunities now open to them. The improved prospects under the new cadre, and the decision to grant the decree of L. Ag. to men passing in the first class, are reported to have had a very marked effect on the keenness of the students, since these concessions have been made known to them. The examination results were on the whole satisfactory. Of the 20 first year candidates, 3 passed in the first and 14 in the second division; 14 second year men appeared, among whom there were 1 first class and 9 second class passes: of the third year, 4 men gained the L. Ag. degree, and 9 the diploma, while 5 failed. Speaking generally of the results of the examination, practical agriculture was well done: the weak point in the paper work was a failure in thoroughness, which in most cases seemed due to a lack of knowledge how to put things down, rather than to a lack of preparation. Of the passed students, ten are joining the Central Provinces Agricultural Department.

6. The College is much indebted to Messrs. Hart, Chief Conservator, and Wills, Registrar, Co-operative Credit Societies, for very interesting papers read before the College Agricultural Association; the College dramatic performances were a great success; and the latter, which bore signs of Mr. Allan's careful tuition, were much appreciated by a large body of visitors. Other prominent landmarks in the history of the year were the visit of the students to the Allahabad Exhibition and the College day. The tone and feeling of the College maintained their high standard and continued to be a testimony to the methods of Mr. Allan and his colleagues.

7. The Nagpur malguzari class has come to an end for the time being. Only 4 recruits were forthcoming for next year's course, and it was thought hardly worth while to engage the time of the staff on such a scanty class. The decline in the number was due to the withdrawal of the offer of scholarships. These assisted malguzari class students were usually men who wanted access to some semblance of a literary education by the easiest possible backdoor, and ultimately drifted back to their districts as hangers-on round Tahsilis and District offices, where they based their claims for employment on having been through the malguzari class. The more correct theory of malguzari instruction seems to lie in teaching just those practical lessons which are being demonstrated in the areas where the pupils live, together with just enough theory to give them some idea of the why and wherefore of the practical work. Such a course as this is in actual operation at Raipur, where transplanting of rice is being taught: and a similar class has been opened at Hoshangabad.

Kamdars are also being taught at Raipur and Hoshangabad, and are found of much assistance to the Department in demonstration work, as well as to private owners. Similar instruction is also offered to Court of Wards employés. But before general agricultural teaching, of however simple a nature, is valued by the agricultural classes, not as an avenue to employment but as a practical help in their calling, a much more general interest in the work of the Department will have to be awakened, which can only be attained by years of successful demonstration of improved methods and constant work through Agri-

A slight change will be made this year in the method of training probationers. Instead of keeping them on the farms all their first year, they will be given a month or two at a time under the care of Superintendents of Demonstration or senior Agricultural Assistants on actual demonstration work. This will show them at an early date what the work of the Department is like: and enable the Deputy Directors of Agriculture to form an early opinion of the character and capacity of the probationers. The special danger to be avoided is for a man to find out after one or two years' service that demonstration work is utterly distasteful to him, and yet be unwilling to risk giving up his appointment.

PART III.—RESEARCH EXPERIMENT.

(a) *Agriculture.*

The Nagpur Farm.

8. So far as the kharif crops are concerned, the season was not a good one. Late continued rains injured the cotton seriously, though up to the month of August it looked very promising. Rabi crops, however, were decidedly successful, especially linseed, of which a rather large area was sown. A series of improvements were carried out, largely by departmental labour and with the help of the students. Work was continued on roads and embankments, which have made substantial progress. Work was started on the dairy buildings, which it is hoped will be ready for occupation in a short time. Expenditure on these matters accounts for the increase under the heads "Farm buildings" and "Purchase of cattle and implements." With these exceptions, there was little or no increase in expenditure. There is a small decline in receipts, due to the less favourable season, and to the transfer of a large proportion of the implement business to Akola and Raipur. This latter cause accounts also for the fall in the number of implements sold. The farm has been laid out on purely educational lines, and has therefore to be treated differently to any of the other farms under this department. It requires more staff, its miscellaneous expenditure is higher, and its outturn is not likely to be so large. The existence of a very large number of students, and observation plots, all of small area, is incompatible with economical working. An area was placed at the disposal of the Economic Botanist for plant breeding and selection. A large selection of different varieties of soy beans from various countries has been obtained, and an attempt will be made during the coming year to select from these a variety which is a free yielder, an early ripener, and gives a satisfactory percentage of oil. Given these *desiderata*, there is no reason why the crop should not make a valuable addition to the income of cultivators in these Provinces, especially where they can follow it by irrigated wheat.

Work on the farm has formed, as it should, by far the most important feature in the training of the students, and it is now well adapted for the functions it has to fulfil in respect of College education.

Mr. Hiralal, the Superintendent, has worked well during the year, and his services, as soon as they can be spared, will be transferred to demonstration, where he will have an opportunity of showing what he can do on harder and more responsible work than has hitherto fallen to his lot.

Raipur Farm.

9. The most important features of the season's work were the growing of sugarcane for seed, of rice transplanting, and the training of *kamdars*. The latter are at present filling a very useful purpose, that of practical demonstration under the Agricultural Assistants. One or two of them have reached a degree of proficiency that has enabled us to place them in independent charge of their circles, and it is hoped that it may prove possible by means of such men to lessen the severe strain on our educated staff, that is threatening to make service under the Department, so far as Chhattisgarh is concerned, seriously unpopular. A man who is literate in the vernacular, and thoroughly understands the particular branch of agriculture on which he has to be employed, can do very good work, under the guidance and inspection of superior officers, while the physique of such a man, belonging as he does to a class that is used to field labour, stands hard work and exposure very well.

I intend to submit proposals on the above lines, for I think that the solution of the Chhattisgarh difficulty may lie in an extended use of superior *kamdars*, inspected by Agricultural Assistants and a Superintendent, with their head-quarters at the district or tahsil towns. Some expedient is needed, for we cannot afford to go on as we are doing any longer. The training class for *kamdars* is increasing in usefulness and popularity, and is meeting a genuine demand from private estates for trained employés. This is one of the most effective ways in which agricultural teaching can be made to permeate the great mass of the cultivating classes, and it is a matter for congratulation that a beginning should have been made so early with it. To teach the sons or employés of cultivating malguzars one or two special methods of improved cultivation, that have been demonstrated as a success in the area in which they live, should logically precede such an institution as a *malguzari* class for elementary agricultural education on general lines, and despite the abandonment of the Nagpur *malguzari* class, the institution of *kamdar* classes here and at Hoshangabad means substantial progress in the agricultural training of the farmer. It is proposed to extend this training to Court of Wards Managers and Assistant Managers. I desire to emphasise the importance of this feature of our work, for the necessity of enlisting private assistance in the spread of improved methods is increasing, and we shall soon reach a limit beyond which it will not be easy to progress very rapidly by purely departmental agency.

Turning now to the work on sugarcane, series were started this year to test the value of the kinds of manure locally available. *Mahua* refuse, oilcake, and sulphate of ammonia are among the most important. The Raipur farm continues to be by far the most important source of supply of seed for our cane demonstration work in the Wainganga area. Cultural experiments in cane will also shortly be started. The two most interesting features of the work on transplanted rice were the working of a disintegrator for grinding bones at Rajnandgaon, experiments on the farm having proved the excellence of bonedust as a manure for rice. It is obviously more economical to grind bones at Raipur, than to send them to Bombay or Calcutta to be ground, and then reimport the dust. The result of our trial showed that there were the makings of a success in the idea, and a local Raipur firm have taken the plant off our hands and intend working it on a commercial scale. They evidently believe that the Chhattisgarhi intends to set about his rice cultivation on very different lines from those followed by him in the past. Green soiling with *sann* seems to promise very well; it is only practicable, of course, in the case of transplanted rice, but seems to put the land into excellent condition to receive the seedlings. A change in the management of the Raipur farm took place this year. Mr. Tundilal, Extra Assistant Commissioner, was appointed Superintendent of Demonstration, and his place was taken by Mr. Bhupnarain from the Agricultural Department of the United Provinces. This officer has much to learn, but has made a promising beginning.

The oil-engine that was previously at Telinkheri, where, owing to the scanty supply of water and to other causes, it was of little use, has now been transferred to Raipur. It is working satisfactorily, though the liability of the area to flooding is apt to cause trouble. The financial results of the year's working show receipts of Rs. 10,037, and an expenditure, including establishment, of Rs. 10,617. These results are not quite as good as those of last year, owing to two reasons, firstly, the lower price of rice, and, secondly, the damage caused to the large area under ground-nut, by very heavy rain early in the season.

Powarkhera farm.

10. The character of the season was by no means as favourable as that of last year. The cotton, owing to the excessive cold weather rains, did exceedingly badly, while the wheat did not come up to expectation, especially that part of it which was sown subsequently to the heavy November showers. The effect of the season is visible in the financial results of the year, which show receipts of Rs. 5,680 against Rs. 5,937 last year. I saw the farm twice during the season, and consider even these results decidedly creditable. Wherever, without detriment to the main objects of the farm, profit

could be obtained, it was sought, and such crops as sugarcane for chewing, chillies and the like were grown in spare portions of the irrigable area with a view to increasing receipts. The expenditure under all heads amounts to Rs. 10,901, practically the same as last year: Rs. 1,500 of this represent the price of an oil-engine. The above total includes a good deal that should be properly charged against demonstration, and steps are being taken to secure a more logical method of account next year.

11. Interesting results were obtained from the experiments in the *optimum* quantity of water for irrigated wheat. The results of previous years were fairly confirmed, and it was found that two (or three) waterings, applied one and two months after sowing, of from 10,000 to 12,000 cubic feet in all gave the best yields, even in the rainy cold weather of 1910-11. Manurial experiments in hay, in view of the action now being taken by the Department to improve the fodder supply of cattle, were interesting, and the fact that sulphate of ammonia, especially in conjunction with superphosphates, proved the best manure, is noteworthy. The supply of this manure is likely to be increased and cheapened, if producer gas engines become more numerous in India, as seems likely. In the absence of information about the cost of the manures employed, it is, however, not possible to tell if the application of these manures was financially profitable. Cotton suffered very badly this year; in addition to the damage from excessive rainfall, *buri* was injured very seriously by frosts, a fact which seems to show that this type of cotton has its climatic limitations. Pig, as usual, caused great havoc on the farm; groundnut is an especial temptation to these creatures, and barbed wire is of not the slightest effect in keeping them out. Here, as elsewhere, considerable attention was paid to soy beans. Pure white linseed and yellow *til* seed were grown, with a view to seed distribution, as the price for these varieties is a little higher than for the local types, while the yield is at least as high. An interesting series of observations were made with reference to the very serious losses caused to the gram crop by caterpillars and the *ugra* or withering due to white-ants. Though the results of a single year cannot be considered as in any way conclusive, yet it would seem that the *malida* and *parbatia* varieties are much less susceptible to these kinds of damage than the local kinds. The main work of the farm is the selection of the best varieties of wheat, and their distribution to private seed farms. The character of the season, as affecting this crop, has been already described. A slight attack of rust was experienced, but not to a degree sufficient to afford a really adequate test of the rust-resisting quality of the different varieties. Among bread wheats, the strong wheats have not as yet proved themselves free yielders under the conditions found in the Hoshangabad farm. Mr. Evans has a large number of different varieties under trial, some of which appear extremely promising, and the best of them will be tried on a larger scale next year. Over 11,000 pounds of selected wheat seed was supplied to seed farms, principally in the Jubbulpore and Seoni districts; in the latter district the Court of Wards under Mr. Gaskin has been vigorously pushing the dissemination of improved wheat seed with very promising results. Considerable quantities of cotton seed, gram and *til* seed have also been distributed from the seed depôt. Efforts have been made in all cases to concentrate sowings of pure or improved varieties, which depend for their price on intelligent marketing; when brought forward in large quantities, the higher prices paid for them by buyers like Messrs. Ralli Brothers make them decidedly profitable crops to grow, but if marketed in small quantities and sold to unintelligent buyers, there is little difference in the prices offered.

I endorse Mr. Evans' commendation of the management of the farm by Mr. Nandkishore, the Superintendent, who belongs to an agricultural family of the Hoshangabad district. This officer has been proposed for promotion to the Provincial Agricultural Service since the close of the year.

The Telinkheri farm.

12. The Telinkheri farm serves at present the purpose of a sugarcane seed farm, and of a testing ground for varieties grown by the Economic Botanist, besides which, a number of crosses of cotton and cotton of selected strains were grown by the Deputy Director. In addition to these, a small area of fodder was grown, partly under irrigation. This proved a great success, and it is proposed, when the farms at Tharsa

and Sindhwai in the Chanda district have been started, to remove all sugarcane work thither and make Telinkheri mainly a fodder farm. Irrigated Egyptian clover gave very profitable results, and an attempt will be made to push this crop in the irrigated areas of Chhattisgarh. The solution of the difficulty of feeding cattle in these rice areas lies probably in some such direction as this. Some very interesting results were obtained from investigations regarding the local mixtures of cotton varieties; the division of these mixtures into their botanical varieties shows that they differ very much in different parts of the province. Nimar and Hoshangabad sow a large proportion of the longer stapled *malvensis*, while the regular cotton tracts, such as the Berar districts, Wardha, and Nagpur, grow a larger proportion of the shorter stapled *rosea*. Considerable differences in proportion, however, exist within the districts.

It is proposed to repair the bund of the tank, which is getting worse every year, and to replace the old masonry water passage by a line of iron piping. This is a costly but necessary improvement that cannot be much longer postponed, though it will more directly benefit the Maharajbagh farm and garden than Telinkheri.

The Akola farm.

13. The Akola farm, in spite of a cotton outturn only about two-thirds of that of the preceding year, had another financially successful season, its receipts amounting to Rs. 12,515, and its expenditure, including that of the demonstration staff employed in the Berar Division, to Rs. 10,592. In future, as demonstration work increases, and is put under a separate Superintendent, separate accounts will be maintained for it under a different system, probably at the Deputy Director of Agriculture's own office. The farm continued to serve a useful function as a centre of demonstration work in the division, and two well attended meetings were held here during the year. The two most interesting experiments performed here were, firstly, the trial of the various rotations of cotton with other crops, and next a comparison of the value of the outturn of different kinds of cotton. The first experiment showed that no falling off in the quality or output of cotton was found to result from growing cotton four years running in the same plot, and it is therefore doubtful whether the local practice of growing cotton continuously is so deleterious as was at one time thought. Further experiment is, however, needed to confirm this. In the other experiment, it was conclusively proved that the most profitable cotton for the local cultivator is undoubtedly the short stapled *rosea*. The longer stapled varieties yield less *kapas* and have a lower ginning percentage. Though a large area of *buri* was grown this year, there seems no doubt but that the uses of this variety are limited; it is a success in wilt infected areas, and will also do well in areas which are a little too damp for *rosea*, though capable of growing cotton of a late ripening variety. It will not stand frost, and will not therefore succeed in the Nerbudda valley. The selected *rosea* gave a ginning percentage of 40, against a percentage in the case of unselected of 39; these results are encouraging, and give hopes that further selection will give even better results. Interesting results were obtained from experimental plots of different kinds of local grasses.

Mr. Bhayalal Dube has continued to work in a steady and reliable manner, and has also controlled his demonstration work well.

(b) *Agricultural Chemist and* (c) *Economic Botanist.*

14. The work of the Agricultural Chemist and Economic Botanist does not lend itself very readily to criticism or description from an administrative point of view. Persons interested in the Department, and anxious to keep in touch with its work, often ask on what their time is spent. In the first place, they are engaged for several hours almost every day in teaching, or supervising the teaching of their assistants. The importance of this can hardly be overestimated, inasmuch as it brings the students directly under the influence of European Professors, and trains them in the habits of scientific thought, which are entirely strange to them when they first enter the College, but are an indispensable portion of the mental equipment of an officer of this Department. In the next place, there is research work, and it is a hopeless task to attempt to represent this in the form

of report at present submitted by these officers. I have therefore asked them to prepare in future a year book of their work, that will serve as a record of their results, whether actual or negative, and will be of interest to other scientific workers in the same field. Mr. Plymen's analytical work shows signs of increasing, in response to a popular demand. In Bombay this demand is very large already, and in order to stimulate it in these Provinces Mr. Plymen has circulated a leaflet, showing how he can help persons connected with agriculture by analysing soils, manures, water, etc. Mr. Graham has continued his selection of varieties of crops, and has also published an excellent little Flora of the Nagpur and Telinkheri farms for the use of students. It is amply fulfilling its purpose, and is also meeting with appreciation from a larger field of readers.

(d) *Entomology.*

15. The Provincial Department have very little to show in the way of results from the work of the Entomological Assistant, which consists almost entirely of studying the habits of various species in the field, and forwarding monthly notes of his observations to the Imperial Entomologist. In the absence of any special outbreaks of insect pests, for the control of which he might be deputed, this officer, though zealous enough, has had little practical work to do. Useful experiments were made in the Northern Circle by Mr. Evans in white-ant destruction, under the direction of the Imperial Entomologist, and an enquiry was started regarding the species of gram most susceptible to damage by caterpillars. The Entomological assistant carried out a series of experiments, under the control of the Imperial Entomologist, in parasites on the cotton boll worm.

(e) *Mycology.*

There is nothing to chronicle under this head.

(f) *Sericulture.*

16. I am in correspondence with the Imperial Entomologist regarding the continuance of the *tasar* growing experiment. It certainly seems a pity that a product, for which there is so great a demand, should be neglected in consequence of difficulties, which it would seem at first sight as if scientific investigation might be able to remove. The Imperial Entomologist has asked for specimens of diseased worms, which have been ordered to be sent him, and I earnestly hope that, in view of the possibilities of the industry in this Province, *tasar* rearing may form a line of research at the Pusa Institute, where, I understand, nothing has been done in the way of rearing the worms hitherto. There are, no doubt, difficulties involved, but the industry should not, in my opinion, be abandoned without exhausting every effort. The work of the Sericultural Assistant was, as usual, a record of imperfect seed, and loss owing to storms, and the various forms of disease. The *eri* worms suffered in the hot weather, as was to be expected, but there is no reason why they should not succeed at other periods of the year. In order that this man's time should not be wasted, he has been largely employed on agricultural demonstration, but he has been kept on at his sericultural work, though from one point of view it is a waste of time, in order not to lose touch with what may some day prove of real importance It is to be hoped that when the Imperial Entomologist has been able to lay down for us a more promising scheme of work, the services of this man may be employed with more profit.

(g) *Pisciculture.*

17. The Director of Agriculture, Bengal, was kind enough to lend the services of the Piscicultural Assistant to examine the waters of the Ramtek tank, with a view to suggesting measures for stocking it with superior species of fish. His report has just been received, and is of an encouraging nature.

(h) *Cattle-breeding.*

18. At present we have two farms, one at Nagpur and one at Hoshangabad, whence a small number of bulls are annually sold to agriculturists for breeding purposes, and so far as this very limited sphere of usefulness extends, the farms serve a

definite end, and their stock are appreciated and fetch high prices. But I am bound to say that so very small a quantity of leaven will take an indefinite time in leavening the whole lump, and it is necessary to see whether there are not other lines along which we might be working as well. In agricultural work, we supplement the supply of seed from our experimental farms by private seed farms on an ever increasing scale. Something of the sort should be done in the cattle-breeding line. What is wanted is, I think, though I express this view with some hesitation, one or more, large cattle breeding institutions run by private enterprise, and carrying several thousand head of cattle of a type that would commend itself to local agriculturists. Magnificent sites for such farms exist in several places in the Province, and it should be possible for these to be managed on lines that will not reduce, but rather increase, the forest revenue of the tracts. These will suffice for the supply of a good type of stock, but the real problem lies deeper. When once we have induced the local farmer, especially the farmer of the rice districts, to realise, that it will pay him to keep a decent type of animal, and give it enough to eat, progress will be rapid. A larger, better-fed animal, will do better work and give a good deal more manure. This will enable more crops to be grown, especially fodder crops, and thus the progress both of field and animal agriculture will continuously interact. These facts are fully realised by the officers of this Department, who are continuing work along the lines laid down two years ago. Haymaking, the cultivation of irrigated fodder crops, and better treatment of cattle are being demonstrated in Chhattisgarh, but hitherto not with much apparent success, though the local farmers bought a good deal of the hay made on the Nawagaon reserve from the early cut *sukla* (Heteropogon contortus) grass, a species which had been previously considered quite unfit for cattle feeding. An important question is, whether we are evolving the best type of animal on the existing farms. I am not sure that this is the case. The Gaolaos are still very leggy, and the Malwi herd were thought by Major Baldrey not to have developed quite as well as he had hoped. At the same time, the type of animal that is being evolved is precisely that which the local agriculturist approves of, though it may not be the best on theoretical considerations. Our programme for the immediate future is, to start a breeding farm in Berar, where the Chief Conservator has kindly seen his way to letting us have a small but conveniently situated area. In Nagpur, if we succeed in bringing to accomplishment the scheme we have in hand for a co-operative dairy, it may prove advisable to start a farm for producing animals of a better milk-giving type than the Gaolao which we are rearing at present. A slight modification of the same type found in the Arvi tahsil is an excellent milch animal. The great difficulty in managing a dairy in Nagpur is likely to be the low yield of milk given by the existing type of animal kept by the Gaolis.

Turning to details, both of the farms made a profit, Nagpur of Rs. 1,757-7-0 and Hoshangabad of Rs. 1,235-14-0. In the former case, all the bulls produced were sold off at the full reserve prices early in the season. Mr. Evans could get far higher prices for his animals, if he took them to the Nimar district for sale; but, as the object of the farm is to improve the Malwi breed, it seems preferable to sell the animals locally, where that breed requires most to be improved than in an area where the general run of animals is superior.

PART IV.—Demonstration, Aid to the Public, Shows, Agricultural Association, and General Progress.

Northern Circle.

19. Mr. Evans' report, while containing no record of work on quite so extensive a scale as the rice and cotton demonstrations in the Southern Circle, is an exceedingly interesting account of development on many different lines, some of which have already attained considerable importance, while others hold out hopes of wide extension in future.

The most important branch of demonstration work has naturally been that connected with wheat. The local demand is for a white bread wheat, unmixed with other varieties, and when offered in sufficient quantities, an appreciably

higher price is forthcoming for it. To meet this demand, Mr. Evans has established a large number of private wheat seed farms, which have been supplied with seed of the desired quality; so far it has not been possible to supply much seed for the market, as it has nearly all been required for the extension of the seed farms. Judging by the popularity and sound organisation of these farms, it seems probable that at no distant date a substantial improvement in the general class of wheat marketed in the Nerbudda Valley will be brought about by their agency. A similar effort is being made to spread the cultivation of a light-coloured variety of *til* seed, similar to that grown in the Nagpur country. The light colour fetches a higher price; and both this *til* seed and the pure wheat seed supplied from the Hoshangabad farm are said by the cultivators to give a larger outturn than that of local varieties. In order that the cultivators should obtain the full value for their improved varieties, it is necessary for them to market their grain in a systematic manner. Instruction is being given to this end, both to individuals and through Agricultural Associations, and there is no doubt but that this must have the effect of increasing the solidarity of local groups of farmers, and must lead to some form or other of co-operative distribution.

20. Other minor but not unimportant features of Mr. Evans' demonstration work were the sowing of *kharif* crops in lines in the Jubbulpore District, the eradication of *kans* in Damoh, and the attempt to introduce irrigated crops into the Jubbulpore District. The first mentioned branch of work, though it does not relate to a very large area, has been an unqualified success; local cultivators readily accept the evidence of the demonstration plots, that the Nagpur method gives better results and a saving in labour charges, and, with the help of several specially trained local men and five experienced farm labourers imported from the Nimar District, where this method is regularly adopted, the practice will be widely extended this year. Experiments in *kans* eradication in the Damoh District have proved two things, firstly, that to secure the eradication of *kans* by means of flooding, it is necessary to submerge the grass at least 2½ feet deep for some long time continuously; and also to pull it up by hand, which may readily be done when the soil is wet; and, secondly, that a turnwrest plough, worked in the dry season, is capable of eradicating *kans* quite satisfactorily, if pulled by strong cattle, and followed up by working the ground with ordinary local implements. The process described by Mr. Evans should not be beyond the means of a malguzar or well-to-do cultivator. It is obvious that the demonstration of work under these two heads alone could be greatly extended, with much benefit to local cultivators, were staff available. But at present, the taking up of any new line of work involves the abandonment of one or other of the existing ones, with consequent discouragement to the people and to local officers who have helped in its development. It is somewhat discouraging to Mr. Evans, too, that the more urgent necessities of the Southern Circle have prevented my placing more staff at his disposal hitherto, but he has uncomplainingly made the very most of his material, and it is to be hoped that the extended recruitment which now appears within sight will gradually remove this difficulty.

21. The same cause, together with the absence of any suitable area for experimental work, has been responsible for the backwardness of the Department in pushing the cause of irrigation in the Jubbulpore District. The results of the small plot at Mahgawan, originally intended as a demonstration plot, made it apparent that what was wanted at first was not demonstration but experiment, and that on a much larger scale than a plot of a few acres would admit of. Proposals have accordingly been put forward for the acquisition of a farm of about 120 acres, which would enable experiments to be made to determine the best and most profitable crops to grow under irrigation on the Jubbulpore soils, and investigations to be conducted into one or two problems peculiar to the agriculture of the district. At present it would appear, that, though only a limited number of *rabi* crops can be grown on the light soils under irrigation, yet much can be done to improve the local methods of rice growing, and there is hope that manuring may substantially improve the outturn of *rabi* crops.

22. Mr. Evans is to be particularly congratulated on the work carried out through Agricultural Associations. He has been, perhaps, somewhat fortunate in the Deputy Commissioners of his circle, most of whom are not only especially interested in the work of the District Associations, but have the happy knack of inducing the Associations to follow their lead. I would especially refer to the Associations of the Narsinghpur, Nimar and Seoni Districts, and to the Seoni-Malwa Sub-Association of the Hoshangabad District. Good work has also been done by many members of the Jubbulpore District Association, though the Association as a whole contains too many members who are not real agriculturists. The Khandwa cotton farm, a small experimental area provided and cultivated in the interests of the District Association by one of its members, has done very good work in testing the suitability of different varieties for local conditions, and is even more important for the encouraging prospect it holds out of the directions in which the work of these Associations is likely to extend. The Seoni-Malwa Sub-Association has made the best attempt so far recorded in the Province to deal with the very serious damage from wild pig, of which it has, with the organised assistance of local *shikaris*, disposed of nearly 300, and has struck out a line which has been prescribed for general adoption by the Local Administration in its recent orders. The seriousness of this pest may be appreciated when it is stated that, until the numbers of the wild pig near the Mahgawan farm are reduced, we find it useless to attempt to introduce improved varieties of rice, sugarcane or special crops such as ground-nuts. The damage caused by these animals is said to have increased during recent years, and there is no doubt but that it presents a serious problem to the agricultural administration of the Province. The inhabitants of Babai, inspired by the example of the efforts made by the District authorities a year or so ago, have made a well considered and successful atempt to capture the remainder of the herd of wild cattle that have for many years destroyed the crops of the neighbourhood. But the good done by these Associations cannot be expressed merely in terms of the individual pieces of work done through their means. In each district where a successful Association is at work, a practical working agency is being built up, with a sense of responsibility, self-respect and keenness, and with more and more clearly defined functions to perform. Such a body, besides serving as a most efficient means for bringing home to the people the lessons that the Department has to teach, acts also as an exemplar of what can be done by a representative body of persons, working with the assistance of Government towards an end in which they and Government are jointly interested.

Good work has been done by Pandit Dajiba Patel, R. B. Bishan Dutt Sukul and Pandit Govind Rao of the Nimar, Jubbulpore and Narsinghpur Associations in particular. The question of giving these Associations a more formal organisation has come under consideration, and Mr. Evans is trying the experiment of appointing the Agricultural Assistant of the district, when one is permanently posted there, as ex-officio Joint Secretary to the Association.

Chhattisgarh.

23. As usual, the principal feature of the demonstration work in the Chhattisgarh Division this year was rice transplanting. It is believed by Mr. Clouston that the area transplanted under the advice or with the help of the Department approached 6,coo acres this year. The areas transplanted during the previous three years were, roughly, 1,coo, 3,500, and 4,000 acres. During the coming year, there will not, it is expected, be much expansion, for the following reason. The Irrigation Department are, for good and sufficient reasons that do not concern my Department, enhancing the water rate. The people, therefore, show an increasing reluctance to enter into agreements, and it is decidedly difficult for us to make arrangements to get rice transplanted in a village where agreements have not been taken. The cultivators, who agree to transplant their rice, have their fields scattered here and there, all over the village, and unless the whole village has combined to take an agreement, there are difficulties in the way of irrigating such scattered fields. For instance, this year a large meeting, attended by many thousands of cultivators, was held at Drug, and it was hoped that the transplantation of a very large area, at least 10,000 acres, would be arranged for, but the cultivators all refused to sign agreements at the enhanced rates, and it was only by dint of subsequent touring, and persuasion of individual cultivators, that

Mr. Tundilal was able to induce any persons to promise to transplant; for it is inadvisable to induce cultivators to transplant where they are not in a position to irrigate. It is to be hoped that the people will now get accustomed to the enhanced rates, and it would be well if the final rate that Government propose to reach and retain were definitely announced, for it is the uncertainty that retards the progress of irrigation, as much as the mere amount of the rate. Arrangements are being made this year to show correct and properly ascertained figures for the transplanted area. As already stated, when discussing the training of *kamdars* on the Raipur Farm, the ill-health of the staff, caused by the privations and exposure inseparable from this particular branch of work, is likely to prove a serious drawback to recruitment, and proposals will shortly be put forward for doing more of the rough work than hitherto by a superior class of *kamdars*, whom Mr. Clouston's scheme of training on the Raipur farm is gradually making available.

24. Ground-nut is rapidly becoming a very popular crop in Chhattisgarh, and its production has already caught up the purely local demand, with the result of some fall in prices, but even so, the world demand for ground-nut is considerable, and gives very attractive prices. Irrigated fodder, such as Egyptian clover, following rice, has been tried on a small scale, and was appreciated, at any rate by the starving village cattle. I hold strongly the view that the next great improvement of Indian Agriculture in these Provinces must come from the better feeding of cattle, and I therefore think that this small experiment may have very important results. The main difficulty will undoubtedly lie in inducing the people to pay water rates for a crop that gives no direct and obvious cash return, and the end in view is sufficiently important to warrant our asking the Irrigation Department to assist us by giving us free water to start with. Even in a backward tract like Chhattisgarh, there are not wanting a few intelligent and enthusiastic helpers, who come forward to impress both by preaching and example the benefits of improved methods on their more backward brethren. Among these I would especially mention Mr. Israel Talibuddin. I was present at the Divisional Agricultural Meeting held at Raipur farm in October last, and was decidedly impressed with the progress that the Chhattisgarh Associations had made. Drug in particular owes much to the unfailing interest of its Deputy Commissioner.

Wainganga.

25. The commencement of demonstration work in the areas protected by the large tanks in the Ramtek, Bhandara and Chanda Districts, while it opens a series of new and most interesting possibilities to the Department, has also made it clear that no good work can be done by attempting demonstration in a fresh area, unless we confirm our hypothetical data by experiment. For this reason a farm has been started on a small and more or less temporary scale, in the Ramtek area at Tharsa, while another will, it is hoped, be in working order next year, at Sindhwai, in the centre of the irrigated tract in Chanda. The chief functions which these farms have to fulfil are, first and foremost, to discover the best methods of growing sugarcane, which appears likely to be an important crop in the irrigable areas of the Wainganga tract. We have much to learn with reference to the manuring and cultivation of this crop. It seems also possible that some species of long stapled cotton may be advantageously grown with irrigation. And it is certainly the case, that we do not yet know all we should regarding the best way of irrigating wheat in the Ramtek area. The new farms will, it is hoped, supply us with data on these important points, besides serving as object lessons to doubting cultivators, in new crops or agricultural methods, and as distributing centres for improved varieties of cane and young fruit trees. In the Ramtek tract, the advantages of growing heavy *gurmatia* rice, rather than the local light varieties, were fully apparent, but the attempt to lay out light land for rice in cultivator's fields was a tactical mistake, for it is a well known fact that a rice field never does much good till it has been cultivated as such for two or three years. The heavy showers of November and January obscured the advantage of our demonstration plots of irrigated wheat, though it is by no means certain that we have yet hit on the best way of irrigating wheat in this tract. Our thick varieties of sugar-cane from Raipur farm have been taken up in a few places in the Ramtek area, and are so far doing well. We have to thank the Hon'ble

Mr. Chitnavis, C. I. E., for assistance in his villages. I do not think we can expect to attain any real measure of success here, until we can show crops growing successfully on our own farm, by the methods we inculcate. This makes considerably more demands on our staff and resources than was originally expected, but the results of success will amply repay them.

26. Prospects are more promising in Chanda, than at one time seemed likely. The Assistant in charge here, Moharikar, has done a good deal better than the Superintendent of Demonstration, Deshmukh, in the Ramtek area. In spite of mistakes committed both by ourselves and the Irrigation Department, mistakes very natural at the commencement of a new undertaking, he has overcome, to a large extent, the local distaste for new methods, and has induced several cultivators to take up the Raipur canes, ground-nut, and the single seedling method of transplantation. We are also much indebted to the Chief Commissioner for his personal efforts in this tract. With more staff, and a farm for experiment, work should progress rapidly in Chanda. We should certainly take up the keeping of sheep for manuring cane and rice, and it may be possible incidentally to do something to improve the wool of the local breed. The Local Administration have ordered the reservation for a few years of a large irrigable area, in the hope that a capitalist may come forward to start a central sugar factory. Experiments will be made by the Department to obtain a few necessary data. Wild animals are a very serious difficulty in Chanda, especially in the case of sugarcane and ground-nut.

Berar.

27. Demonstration work in the Berar Division was mainly connected with the seed farms, which have now increased to 42 in number, including a few in the adjoining cotton tract of the Nagpur country. No less than 112,000 lbs. of cotton seed were grown on these farms, which are beginning to take a somewhat prominent part in Berar agriculture. A large quantity of *buri* was put on the market this year, the total quantity sold over the province as a whole being very little short of a lakh of rupees in value. It is clear, however, that, save in a few special areas, it will never pay the cultivator as well as *rosea*, which is now very popular in Berar, and for which a large demand is springing up. It is not a question of obtaining a fair price for long stapled cotton: thanks to the management of the Empress Mills, as good a price as could be offered by English buyers was obtainable in all cases. A Divisional Agricultural Meeting was held on the Akola farm in October, which was very largely attended. In February a ploughing match was organised by Rao Bahadur D. V. Bhagwat, for which a piece of ground on the farm was lent by the Department, who also arranged for the necessary judging. The match was exceedingly successful, and aroused the greatest interest in the neighbourhood. It is to be followed by further matches next year. The Agricultural Associations of the Berar Division contain some useful and enthusiastic members, and are fully as successful as any in the province. But here, as elsewhere, a little more business-like management is required. As the Deputy Director observes, the increase in the available demonstration staff should be of great assistance to these Associations, and it would be advantageous here, as in the Northern Circle, to appoint an official Joint Secretary from among the demonstration staff, to help the unofficial Secretary when necessary. The Buldana Association have fixed an annual subscription for their members, and propose to apply the funds so obtained in developing local agricultural shows. Wild animals are not nearly so troublesome in Berar as in some of the other divisions, but a herd of wild cattle exist in the Buldana District that cause a good deal of injury to the crops of local cultivators. Operations against them were not completely successful, but a further attempt will be made after the rains. The department are specially indebted for assistance and example to Messrs. Ramkishen Pethe of the Amraoti and Landge of the Yeotmal Association. The Buldana Association have done excellent work as a whole, and I am very grateful to the Deputy Commissioner for his constant assistance and interest. Mr. Clouston's circle includes demonstration of three widely different types, each on a somewhat extensive scale; it contains four farms and a fifth is under contemplation. In spite of the extent and diversity of the subjects for which he is responsible, his control has lost nothing in efficiency, and he has been always ready to attempt new enterprises. It is, however, highly desirable

that he should be relieved of some portion, at any rate, of his charge, to enable him to devote more time to the task of supervising demonstration work in the important Wainganga and Chhattisgarh areas.

28. Full advantage was taken of the opportunity afforded to the Department of reaching the agricultural public by means of the various local festivals. Meetings of the District and Divisional Associations were arranged with agricultural shows and demonstrations of the special nature required in the different tracts. Detailed notices of these will be found in the demonstration reports of the Deputy Directors, which are this year printed separately. I would in particular mention Bandrabhan, Singhaji, Mundara, Kharora and Siharpath. Not only on departmental but on general administrative grounds I think every encouragement should be given to these gatherings, and other Departments than ours might find it advantageous to avail themselves of these opportunities for spreading a popular knowledge of their work.

Fairs.

PART V.—AGRICULTURAL ENGINEERING.

29. An important step was taken at Powarkhera, as well as on the farms of the Southern Circle, in developing the sale of implements. A contract was entered into with Messrs. Burn & Co., by which the Department agreed to sell certain implements produced by that firm, and to induce suitable local shopkeepers at places like Khandwa, Saugor, and Itarsi, to sell and stock certain types of implements that are already to some extent in request. In return, Messrs. Burn & Co. expressed their readiness to work at the improvement of implements on lines indicated by the Department. This, while not binding the Department in any undesirable way, may prove the beginning of the advent to the province of the local seller of agricultural implements. Drawings and specifications were sent home for the requisite modifications to fit for local conditions the Raja reaper now used in the Punjab, and the first specimen should be received in time to try it on some suitable crop next autumn. If it is a success, and the firm are able to sell it at the reduced price which they estimate, there should be an effective demand for it at once throughout the Nerbudda Valley. An oil engine and pump is being purchased, in order to meet not only the need for irrigation on the farm, but the demand which is springing up in Nimar, Harda and Betul for power irrigation from wells and streams. The services of Mr. Cove, Head Master designate of the School of Handicrafts, Nagpur, were placed at the disposal of Mr. Evans for a short time, to assist him in designing an improved winnower and seed drill; machines have been evolved, which it is expected will prove a practical success. Specimens are being now made under Mr. Cove's directions in Nagpur, which will be tried in regular work during the coming season. The sale for winnowers was not quite so large this year as last, owing to the absence of rain in the hot weather, as these machines are bought in largest quantities when the winnowing season threatens to be wet.

30. The Akola implement depôt shows a great increase of work. The sale of turnwrest ploughs has nearly doubled, and it is probable that the ploughing match was to some extent responsible for this increase. It is hoped to make this depôt a centre for the upkeep and repair of oil engines, which several gentlemen announce their intention of buying, to run small ginning plants on their seed farms. A mechanic has been entertained, and spare parts will be stocked. He will visit, inspect and repair all oil engines purchased on the advice of the Department, here as well as in the Northern Circle.

PART VI.—PUBLICATIONS AND DISSEMINATION OF AGRICULTURAL INFORMATION.

31. The *Agricultural Gazette* continued to be issued in Hindi, English and Marathi. The number rose from 5,680 in 1909-10 to 5,865 in 1910-11. The increase has been entirely confined to the Marathi Edition. The principal difficulty experienced during the year was the great delay of the local press in printing off the copies, owing to plague. Steps have been taken to remedy this. Bulletin No. 4 on the quality of wheat exported from the Central Provinces by Mr. Evans, Deputy Director of Agriculture, Northern Circle, was published

during the year. Contributions to the Press were furnished on various important features of the work of the Department. It is proposed to issue vernacular leaflets on certain subjects to members of Agricultural Associations.

PART VII.—MISCELLANEOUS.

Museums.

32. Really substantial progress has taken place in the Nagpur Museum. The local Administration have officially recognised that this Museum has far greater possibilities as a collection of the extensive and interesting *fauna* of the Province than as a repository of a limited and comparatively uninteresting set of archæological exhibits. Nature rather than man has played the larger part, so far, in the history of the Province, and the record of her doings is likely to be the better worth studying of the two. We have therefore appointed as Assistant Curator an educated man, with a knowledge and taste for natural history, and a decided capacity for setting up and arranging specimens, and are thus in a position to invite gifts of specimens from local officers, with the hope that, when these are set up, they will by their appearance encourage further offerings, which has hardly been the case hitherto. In a very few years, it is hoped that the zoological section will be worthy, to some slight extent, of the reputation of the Province as a haunt of wild life. In pursuance of the above policy, it has been recognised that it is unnecessary to attach an Archæological Assistant permanently to the Museum. We have an Assistant on temporary duty, whose work at present is the compiling of a catalogue. It is hoped that the result will be a descriptive list of the exhibits, including coins and inscriptions, with a few illustrations, and prefaced by an introduction that will refer the more striking exhibits to their place in the ancient history of the Province, of which it will furnish a short *resumé*, illustrated by constant references to the contents of the Museum and to well-known remains outside it. The third or miscellanous section of the Museum is the one that causes the greatest misgivings. It is overcrowded; it contains a large number of articles that never ought to have found a place in any Museum, but at the same time it is by far the most interesting section to the poorer class of Indian visitors, who constitute at least 90 per cent of the numbers that pass the turnstiles. And it would be a piece of official priggishness to remove what gives pleasure to so many, in order to arrange the section on lines more theoretically appropriate. At the same time, it must be remembered that this section contributes very largely to the overcrowding of the Museum, which will become acute, when the work of the Assistant Curator on the Natural History section has had time to have its effect. It is not proposed to publish the catalogue of the Miscellanous section, which is a document of appalling dullness, nor will any attempt be made to compile a catalogue of the Natural History section, until it has been rendered far more complete. The catalogue of the Archæological section will be published separately, as soon as it is complete. Mr. Graham was in charge of the Museum throughout the year, and took a great and active interest in its management, which was perhaps not the less after the prospects of materially improving the Natural History section had developed. The numbers that passed the turnstile were 96,052.

There is little to record regarding the Raipur Museum. The services of the Archæological Assistant were lent to inspect and catalogue the Archæological exhibits there, which are, however, neither numerous nor particularly interesting. The work of teaching weavers the use of the improved loom, under the auspices of the District Council in connection with this Museum, continues.

C. E. LOW,

Director of Agriculture,

Central Provinces.

Govt. Press, Nagpur:—No. 1232, Dir. of Agri.—3-9-11—530.

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No. 488 / XIII-9-12.

CENTRAL PROVINCES ADMINISTRATION.

Agriculture Department.

Nagpur, the 9th November 1912.

READ—

Report on the Department of Agriculture, Central Provinces, for the year ending 30th June 1912.

RESOLUTION.

Although the report on the operations of the Agricultural Department for the year 1911-12 makes no mention, except in connection with the Economic Botanist and the Agricultural Chemist, of the conditions under which the year's work was carried on, it is clear, having regard to the increase in the number of farms and the great advance made in demonstration, that the superior staff have been working at high pressure. The expansion was not on new lines introduced by the Department, but was in response to increasing demands made on their activities on lines of already proved practical utility, and the pressure will therefore tend to intensify as time goes on. The failure of the Superintendent of the Raipur farm is a regrettable incident in the report: the Chief Commissioner, however, mentions it deliberately, not with any idea of attaching to it an importance which the case itself does not deserve, but merely to emphasise the one cardinal factor, close supervision by the superior staff, that is essentially necessary to success in any branch of administration. The necessity for this supervision Sir Benjamin Robertson had occasion to notice in reviewing the reports on the Veterinary Department and on Co-operative Credit Societies, and it is equally noticeable in this Agricultural report. There are limits to the capacity of the best of staffs, and, while the Chief Commissioner has much pleasure in testifying to what he considers to be the particularly high capacity of the Agricultural staff, the report in his opinion contains strong internal evidence that they are being taxed to a degree dangerous to the interests of the Department. Moreover, as the work of the Director increases, more decentralisation will be necessary and higher powers and greater responsibility will devolve on the Deputy Directors. With progress maintained at the present rate, it will probably not be long before there will be enough going on in each Division to keep a Deputy Director fully employed; the time has already come when two Deputy Directors, even of the calibre and enthusiasm of Mr. Clouston and Mr. Evans, cannot give the work the superintendence it needs. It is to be hoped that the third Deputy Director and the Assistant Director, whose entertainment has already been proposed, will be speedily available.

2. Turning to the question of Agricultural education, Mr. Allan has devoted assiduous personal attention to the interests and requirements of the College. The Chief Commissioner observes with regret that the College is not succeeding in attracting any considerable number of the cultivating castes. For this and other reasons the average type of recruit produced by the College seems, temporarily at any rate, to be in some respects inferior to the standard hitherto achieved, and required for the work in which the Department is engaged. The Chief Commissioner desires the Director to submit proposals as soon as possible for rendering a more suitable type of student available for recruitment to the College, and wishes that in the meantime every effort should continue to be made to attract cultivating castes. He has no doubt but that a mixture of these, with such individual members of the literary castes as experience may show to be well adapted, physically and mentally, for agricultural work, will afford perfectly suitable material for the Provincial and Subordinate staff as at present constituted.

3. The results attained on the various farms afford, with the one unfortunate exception already mentioned, pleasant reading. Mr. Allan's dairy, started at Nagpur in connection with the College, has, it is understood, attracted considerable attention among those who are interested in problems connected with the improvement of public health in towns. The Akola farm again returned a substantial profit, and the figures furnished by Mr. Low, showing that it would be easy to pay 10 per cent or more on a cotton-seed farm, should do much to further the suggestion that has been put forward by Mr. Standen and Mr. Clouston for introducing a system of large seed farms, financed by private funds, as an intermediary step between the Government farm and the small private seed farm. The Co-operative Society for the production of pure wheat seed in the Jubbulpore district, which owes its inception to Mr. Evans, is another instance of a successful venture with a seed farm. It is certain that the future of agriculture is largely bound up with that of Co-operative Credit. In the case of the Jubbulpore Society, however, a good deal of the profit comes not from the provision of improved seed, but from putting the produce in bulk on the market and thereby securing better prices. This advantage would not be so manifest in the case of a cotton-seed farm. It is doubtful whether much profit would be derived from bulking the produce of *rosea* cotton: there might be some in the case of *buri* with its long staple, but *buri* is not, and probably never will be, much grown in Berar. But the Akola farm results would seem to show that fairly large areas of crops like cotton or sugarcane, capable of carrying expensive supervision, can be made to pay a good profit on seed production alone and apart from any question of marketing the produce. The supply of improved strains of seed will be an important feature of the Department's future work.

4. One of the most important results secured in the year has been the successful cultivation at Telinkheri of *berseem*, which in some cases yielded as much as 20,000 pounds of green fodder per acre at a single cutting. It is not only that, as the Director anticipates, this may go far to solve the fodder problem near big towns, but the production of fodder, being directly connected with the supply of manure, is also of great importance in the progress of all irrigated tracts. If *berseem* can yield fodder on this scale, there would seem to be no reason why good buffaloes should not be kept and stall-fed in larger numbers in areas where irrigation is possible, thereby increasing the supply of manure which is so essential for the development of the full productive power of irrigated land. The Chief Commissioner would be prepared to consider proposals to supply water free, or on specially favourable terms, to *berseem* crops in the irrigable areas.

5. Sir Benjamin Robertson notes with pleasure the interest shown by the agricultural public of the Jubbulpore district in the recently started Adhartal farm. The new Sindhwahi farm in the Chanda district promises well: in this district sheep are of some importance, the breed deserves careful improvement and the results of experiments in this direction will be awaited with interest.

6. Experiments in sericulture have again resulted in failure owing to disease among the worms. Economically, the industry would be profitable if disease could be controlled, but in the circumstances reported it is doubtful whether it is worth while to persevere with these attempts.

7. The cattle-breeding farms again show good results so far as they go. But, while they can set a standard of breeding and assist private enterprise by the supply of good bulls, it cannot of course be expected that they will produce any appreciable direct effect on the supply of cattle for the Province. The solution of this question must be looked for in other directions, and may possibly be found in small private farms of which some have already been started by the Court of Wards and by malguzars, and which have already attained some success.

8. The principal lines of demonstration work deal with transplanted rice, sugarcane, cotton, and the destruction of pig. As regards rice, a good advance is now expected in the area that will be actually transplanted in Chhattisgarh: the question will be of increasing importance as work progresses on the Mahanadi and Tendula irrigation projects, and a repetition might well be made of the interesting experiment tried this year of personally conducting several Chhattisgarhi cultivators to the Balaghat district, where the whole method of management of this form of rice cultivation was explained to them by the local cultivators, with the result of convincing them not only of the advantages, but of the practical feasibility, of transplantation.

With the extension of irrigation, there is scope for a large expansion of the sugarcane area. Until the advantages of wheat irrigation are more fully understood and established, sugarcane is of special importance in that it will take the water intended and available for the rabi crop. It is understood that the irrigating capacity for the various crops, especially sugarcane, is now being worked out with the Irrigation Department for each of the more important tanks.

The Department is considering the possibility of the extension of cotton in parts where it has hitherto been unknown, and the introduction of a longer stapled cotton in tracts with a heavier rainfall than that of Berar.

It is interesting to note that in the Northern Circle, in the districts of Hoshangabad, Nimar and Damoh, no less than some 12,000 pig have been killed up to date in five tahsils. The method so successfully employed in this part of the Province would only be possible in suitable country, fairly open and without too continuous jungle, but it is a good example of what can be effected under the influence of the Agricultural Department.

9. The demand for agricultural implements is steadily increasing: a large number of turnwrest ploughs were sold in Berar, and agriculturists are now coming forward for comparatively expensive machines. The policy of enlisting private enterprise in the actual sale of machines is sound and is being steadily continued, but for many years to come the Agricultural Department cannot divest themselves of all responsibility in this matter. If a machine breaks down the cultivator will look to the Department for help, and this development in the use of machinery would seem to foreshadow the necessity, if not of the appointment of an Agricultural Engineer, of introducing the subject of engineering in the training of the staff.

10. The Agricultural Associations continued to do good work. Their success is directly dependent on the active interest and co-operation of the District Officer, and Sir Benjamin Robertson is pleased to see that various officers are mentioned in the report as having given valuable assistance to the Department in this and in other ways. The other factors contributing to success are to confine each Association to a homogeneous area of not too great an extent and then not to consider general or theoretical lines of development, but to study the practical local needs and problems of that particular tract.

11. The departure taken in respect of the cotton forecast is very important and will be much appreciated by the cotton trade if it results, as the Chief Commissioner has reason to believe that it will result, in providing a more reliable and accurate estimate of the outturn.

12. Not much is said of what has been done by the Economic Botanist and the Agricultural Chemist, but the Chief Commissioner would express his appreciation of the laborious, if unostentatious, work which has been performed in the face of many difficulties by Mr. Graham and Mr. Plymen. It is to be hoped that they will shortly be in occupation of proper laboratories, without which no work is possible except under most disadvantageous conditions.

13. Sir Benjamin Robertson desires to acknowledge the capability with which Mr. Low has continued to direct the operations of the Department. The rate of progress has been rapid hitherto; its continuance must depend mainly on the question of funds. So far as this is concerned, the Department may rest assured that the Chief Commissioner will afford it the fullest assistance of which provincial resources will admit.

ORDER.—Ordered that a copy of this Resolution, together with the enclosure, be submitted to the Government of India in the Revenue and Agriculture Department, that copies be forwarded to the Director of Agriculture and to all Commissioners and Deputy Commissioners, Central Provinces, for information and guidance, and that it be published in the Supplement to the *Central Provinces Gazette*.

R. C. H. MOSS KING,

Second Secretary to the Chief Commissioner,

Central Provinces.

Govt. Press, Nagpur:—No. 1419, Civil Sectt.—13-11-12—530.

Report on the working of the Department of Agriculture, Central Provinces, for the year 1911-12.

PART I.—ADMINISTRATION.

There were no changes throughout the year among the senior staff.

Mr. Tundilal held charge of the Chhattisgarh Division throughout the year. In the Wainganga charge, Mr. Deshmukh was replaced by Mr. Hiralal, it being thought that the former required more training in farm management. Mr. Bhayalal acted as Superintendent of Demonstration of the Akola Division in addition to his work as Farm Superintendent, while in the Northern Circle, Mr. Nand Kishore, who had achieved a reputation as a successful farm manager at Hoshangabad, was given Divisional charge with effect from 1st May 1912. In all cases the Divisional Superintendent was given general responsibility for supervision of the Farm Superintendent's work, and the latter officer was subordinate to him.

The total expenditure of the Department during the year was Rs. 4,79,000 as compared with Rs. 3,71,563 last year.

2. During the year proposals were sanctioned for the bringing on to a single cadre of the whole ministerial staff of the Department. Owing to the farm clerks, readers to experts and others being on separate establishments, a difficulty was felt in arranging for their promotion, with the result that a good type of man was not forthcoming. By this scheme, the head office will gain in efficiency by receiving a constant flow of men with experience in the details of office work on farms and in the offices of Deputy Directors of Agriculture. Sanction has also been received to the conferral of powers of countersigning contingent and travelling allowance bills on Deputy Directors of Agriculture, a measure of decentralization that was much needed. Both Deputy Directors of Agriculture have now their own separate office staff, and work has been expedited, while the head office has been relieved of a good deal of unnecessary correspondence. This is the more necessary, in that the publication of cotton returns, the compilation of rail-borne trade statistics, and the control of Factory Inspectors had recently been added to the work of the Director; while the supervision of the measures shortly to be undertaken for the improvement of small industries will shortly become a serious addition to his duties.

3. The meeting of the Board of Agriculture was attended by the two Deputy Directors of Agriculture, the Agricultural Chemist, the Economic Botanist, the Principal of the Agricultural College, and Mr Tundilal, Extra-Assistant Director. I did not attend the meeting owing to the fact that it was fixed at a time immediately preceding the Delhi Durbar, and so long an absence from the Provinces on my part would have been undesirable. All the eight farms, either actually at work or preparing to start, were seen at least once by myself, and I also attended all Divisional Agricultural meetings, as well as one or two fairs, and several District association or sub-association meetings. I visited 15 out of 22 District head-quarters and discussed the local agricultural programme and conditions with District Officers.

PART II.—AGRICULTURAL EDUCATION.

4. There were no changes of importance in the administration of the Agricultural College during the year under report.

Turning to the work of the year, it must be said that the record is not in all ways an encouraging one. Of the first year, 16 passed out of 24; of the second year, 14 out of 19; and in the third year, out of 15, 12 passed, one in the first class. The failures were mostly in minor subjects, to which students are inclined to attribute too little importance, partly, no doubt, owing to the comparatively small proportion of time allotted to them, which the spreading of such subjects over a three years' course is found to involve. A remedy for this and for other defects in the training is being sought by the Principal in proposals which he is making to concentrate agriculture mainly over the latter period of the course, devoting

the earlier portion of it to the training in methods of thought and observation that are afforded by subjects like Botany and Chemistry. The opportunity is being taken to concentrate the teaching in such subjects as Veterinary work, by giving more lectures during a shorter period of time. The course in this subject will, it is hoped, be rendered more practically useful by dealing more with simple ailments and their treatment, and less with general theories. Similarly, the need has been felt of a more practical knowledge on the part of Assistants on demonstration work, of how to set up, repair and work the various types of implements now being sold by the Department. The increasing readiness on the part of cultivators to take up costly and complicated implements, such as oil-engines and reapers, calls for a good deal of practical knowledge of mechanics on the part of the staff.

5. The College dairy has been started, and has certainly had the effect already of showing not only the students, but to some extent the general public, the standard of cleanliness and efficiency that can be attained in the management of domestic animals and in the production of milk and butter. If it helps to raise a spirit of revolt among respectable Indians against the horrors of the indigenous milk-supply, it will have served an excellent purpose.

6. The appearance of the hostel and of the grounds surrounding it are being steadily improved at a very slight cost, by the constant care and supervision of Messrs. Allan and Graham. The conduct of the students, with one exception, which was in no way typical of the spirit of the College, was thoroughly satisfactory. The one disquieting feature is, that all the efforts that could be made by the Department and the various Deputy Commissioners and other officials, who lent their assistance, had very little result in inducing students of agricultural castes to join the College. This is a matter of the very greatest importance and one on which the future success of the Department very largely depends. It is earnestly hoped that redoubled efforts will be made during the coming year. The absence of this indispensable class is beginning to have its effect, both on the College and among the Demonstration staff.

The number of passed students enlisted in the Departmental staff continues to maintain a steady average of 9 or 10 a year.

7. The short courses on the Powarkhera and Raipur Farms were again very successful. Nine men were under training on the Raipur Farm, mostly in rice transplantation. On the Government Farm some 37 men in all entered for the three courses (one in kharif and two in rabi), most of whom passed successfully. The majority of these were cultivators or their servants, and came from every district in the circle except Nimar, where agriculture is comparatively advanced. A six months' course was also given to one or two wards and Court of Wards officials. The effect on one of the former from Jubbulpore was most beneficial. He had been a constant source of trouble to the Court of Wards officials, owing to his refusal to remain at school or behave himself. He remained contentedly for a year at Powarkhera, where he put on nearly 2 stones in weight owing to hard exercise and a healthy life on the farm.

PART III.—Research and Experiment.

(a) *Agriculture.*

The Nagpur Farm.

8. The most noteworthy features of the year's work on the Nagpur Farm were the attempt to grow soy-beans and the experiments in green-soiling and in the intercultivation of wheat. Though none of the numerous varieties of soy-bean sown were at all successful, the weather conditions last year were sufficient to account for this. I remember hearing that considerable difficulty was experienced in acclimatising the existing farm variety. The intercultural wheat experiments have not yet gone on long enough to make their conclusions certain: but there seems good reason to hope that a low seed rate, widely spaced rows and intercultivation may lead to a considerable increase in the yield.

Mr. Allan considers, as a result of his experiments in green-soiling, that the yield of the following crop depends entirely or almost entirely (1) on the rainfall received and (2) on the time that elapses, between the ploughing in of the green crop and the sowing of the following *rabi* crop. His contentions are illustrated by a series of graphs. They lead to the conclusions that early sowing and ploughing in are needed to make green-soiling a success ; but that the results of this process depend so largely on the total rainfall over a comparatively limited portion of the monsoon season, as to render it a somewhat uncertain process at best.

The appearance and management of the farm steadily improved during the year, thanks mainly to Mr. Allan's close personal supervision. Being as it is, an instructional farm, it cannot be expected to give such financial results as farms devoted mainly to the production of seed.

The Powarkhera Farm.

9. The *kharif* crops on the Powarkhera Farm suffered to some extent owing to the prolonged monsoon and heavy cold weather rainfall. The results of irrigating wheat this year were, to some extent, obscured by these conditions: but, on the whole, there is reason to conclude that one, or perhaps two, waterings well on in December or January caused a decided increase in the outturn. The heavy later rains, following the weak opening of the monsoons, were very favourable to green-soiling, which gave good results here and elsewhere. Two or three new varieties of soy-bean from Manchuria were tried : these maintained their high oil content very well, but the outturn was very low. There seems some reason to believe that they may do better if sown in the *maghai* season than either as a *kharif* or a *rabi* crop. If a good yield and high oil content can be secured, this crop will form an important addition to the agriculture of the Province. Early ripening cotton and *tur* were grown to provide seed for cultivation, the losses during recent years from frost having shown that the late ripening cottons, such as *buri*, are not likely to succeed in the north of the Province. The main work of the farm relates to wheat: and the crossing and selection of different varieties of this crop were continued during the year. There is a particularly promising strain of *jalalia*, selected on account of its free tillering and heavy yielding qualities, that attracted much attention from visitors, its outturn being 1,100 lbs. without manure or irrigation. The attack of rust that affected the north of the Province this year reached the Powarkhera Farm, but it was not acute enough to do any particular damage.

It cannot be expected that this farm, which has no irrigation practically speaking, and grows but little cotton, will give as good financial results as some of the other farms in the Province: but this year, after deducting a sum of Rs. 2,765, spent on capital account, there was a net profit of Rs. 1,200, if the pay of supervising establishment be not taken into account. Wheat, of which 82,000 lbs. were sold for seed from this farm, is not a heavy yielder in the Central Provinces. It will no doubt ultimately be advisable to raise the cost of selected seed to the purchaser. A *serai* for the use of visitors to the farm was under construction at the end of the year.

The Adhartal Farm.

10. It was decided last year to start a farm in the Jubbulpore District to experiment in and demonstrate the best methods of utilising the irrigation water of the new Government tank, to test various points in connection with embanked wheat fields, and to serve as a focus of agricultural work in the Jubbulpore Division. The starting of this farm was in response to a real popular demand, and greatly interested the agricultural public of the district of Jubbulpore. A great advantage that this farm will have is its close proximity to the city of Jubbulpore. Looking at the question in the light of past experience, I am of opinion that most of our farms are too far away from towns: even 4 miles, the average distance, is too much. Good progress has been made by the Superintendent, Mr. Ganpati Narain, in putting the farm into working order: and I must take this opportunity of expressing the great indebtedness of the department to Mr. Learoyd, for the rapidity with which he pushed on construction.

The Mahgawan Farm.

11. This small farm served the purpose, before the Adhartal Farm was started, of an experimental and demonstration station for the Jubbulpore irrigated areas. The chief lessons learned there have been (1) that a late irrigated rice gives a high yield, (2) that the best crop to follow rice is an *utera* crop of linseed or *urid*. Wheat can be grown as a sole crop, with green-soiling or other manuring. The damage from pig in this tract is so great, that late rice and ground-nuts are barely profitable to grow under existing conditions. Wheat on this farm suffered somewhat severely from rust, the crop grown in the lighter soils being especially subject to attack. The people exhibit a decided preference for varieties of rice like the bearded "Nasik early" which is not much affected by pig.

The Akola Farm.

12. The Akola Farm again had a very successful year. The average yield of rosea cotton was 678 lbs. of *kapas* to the acre. The cotton crops of the farm were markedly superior in appearance to those in the surrounding fields of equally good soil and position. Lack of rain in the growing period, especially in July, led to the yield of *buri* being comparatively low, only 446 lbs. to the acre. Although *buri* has a longer staple and fetches a higher price, it yields the cultivator about Rs. 40 less per acre than rosea does, and is therefore bound to be confined to tracts of comparatively high rainfall, or wilt-infested areas, where it has well maintained its immunity during this season's working.

The financial results of the season's working were an expenditure of Rs. 13,957, receipts of Rs. 19,167 and a net profit of Rs. 5,210, after paying all charges staff included. This gives a net profit of nearly Rs. 20 an acre, which could be considerably increased were the farm managed simply as a cotton seed-producing centre. The large experimental area increases the expense and detracts from the receipts. The farm, including land and buildings, which last were designed on a rather lavish scale, cost between Rs. 80,000 and Rs. 90,000, so that it is clear that it would be easy to pay 10 per cent or more on a cotton seed farm.

Among the more interesting deductions which have resulted from the experiments carried on at this station are the facts that no bad results seem to arise from growing cotton continuously on the same plot for a series of years, and, in the converse, no particular benefit is derived by rotation in the case of wilt-infested areas: and that certain artificial manures, such as nitrate of soda and sulphate of ammonia, would be profitable investments for the farmer, if their price fell, or that of cotton rose. Both events seem probable: with the manufacture of iron in India, the latter manure could be produced at a much lower price than that at which it can be obtained from Europe, while the general tendency of cotton prices seems on the increase.

An analysis of the various grasses grown on the farm shows that they are decidedly low in feeding value, containing only about a fourth of the nutritious elements found in a common local leguminous plant like *shevra*. It will be interesting to know whether this peculiar poverty is characteristic of the grasses of the Central Provinces generally, which fetch a lower price in Bombay than those of other places.

For most of this ginning season, the gins were worked by a Gardener oil-engine supplied by Messrs. Burn and Company, and so far with satisfactory results.

The farm maintained its popularity as a centre for demonstration work: it attracted 1,758 visitors during the year, and a most successful Divisional meeting was again held there in October last. I think it would not be going too far to say that it is almost the most popular Government institution in Berar.

The Tharsa Farm.

13. This farm is beginning now to get into good working order and its condition is creditable to the Superintendent, Mr. Lal Muhammad. Not many deductions can be drawn from the experimental series so recently begun, but the crops look well, and are a great contrast to the low yields and slovenly cultivation beyond the fence.

The Department obtained possession in May 1911: the second *kharif* crop is now in the ground, and the buildings are nearly complete. The vegetable garden did not do so well as it might have, owing to the absence of farm yard manure during the first year. The fruit trees are looking very well, and should yield a handsome income in due time. The irrigation of early-sown maize and *kharif juar* in May and June seems a promising line of work. Rice did well, considering this was the first time it had ever been grown on this area. The heavy yielding varieties of the Wainganga valley seem likely to do at least as well as *gurmatia*. The irrigated wheat gave heavy yields; but the land is not yet sufficiently standardised to admit of experiments in varying quantities and methods of irrigation, with and without manure: and it is this which will be the most valuable line of research on the Tharsa Farm.

The Telinkheri Farm.

14. This little farm is too small for the Department to run at a profit, but it affords an interesting object-lesson for visitors to Nagpur, and enables the Deputy Director of Agriculture to have a few fields of cane, cotton and rice grown under his close and constant supervision. The most interesting crop was undoubtedly the *berseem* (Trifolium Alexandrinum). It yielded as much as 20,000 lbs. per acre at a single cutting in some cases, and filled the fields with a dense green mass of foliage, that cooled the air and attracted a heavy dew night after night, long after the hot weather had set in. With sufficient irrigation, this should go far to solve the fodder problem near big towns. In the coming year, this farm will be mainly devoted to the growth of fodder for the dairy farm that is being started here.

The Sindhwahi Farm.

15. The large village of Garmosi, irrigated by a fine tank of native construction, was purchased by private treaty and handed over to the Department during the year. The farm will, however, be known as Sindhwahi, which is a railway station on the Bengal-Nagpur Railway, closely adjoining the farm buildings. It will serve as a centre of work in the great and important district of Chanda. Though a sparse population and undeveloped resources have prevented this District from figuring prominently in the economic history of the Province, its possibilities strike every officer who knows anything of it. It is probably second to none as a field for work by the Agricultural Department. It is capable of producing high class cane and rice, and very likely irrigated cotton: its sheep and cattle also deserve careful improvement. It possesses numerous sites for large tanks: some three or four have been actually constructed and Government is pursuing an active colonisation policy in the waste lands now made available for the plough.

The farm, besides serving as a demonstration centre for this district, will afford an object-lesson in village management for our staff and students. It is proposed to allow the actual cultivators to retain their lands, and attempt, by example, guidance and help, to build up a model village beside the Government farm. The buildings have been under construction since the cold weather, and will no doubt ultimately be completed.

The Raipur Farm.

16. The record of work at this farm was unfortunately marred by the unreliability of the Superintendent, a recent importation from the United Provinces, who has now left the Department. His neglect caused a serious loss with the result that the receipts fell short of the expenditure by Rs. 4,211, an unusually bad record. The very wet season rendered irrigation a great deal less advantageous than usual: and the wheat crop was seriously attacked by rust. In spite of the high rainfall, transplantation continued to show much better results than *biasi*, though in the case of the experiment conducted to show the minimum irrigation requirements for rice, the water taken to save a *biasi* crop from serious loss was the same or very little less than that required by transplanted rice. Nearly 20,000 canes were supplied by the farm for seed, a quantity which could have been exceeded many times over, but for the neglect of the late Superintendent. A serious loss of cane seed was caused by red rot, which was greatly encouraged by the damage to cane from wild animals. Some of our best species of thick cane seem peculiarly liable to this disease: and the problem of a supply of disease-free seed will sooner or later have to be faced, for cane growing has at last begun to desist

from its hitherto downward course, and to show signs of regaining its original position, or even surpassing it. Two oil-engines were working on this farm, and, on the whole, successfully, though one of them was a very old machine, and the other, which we had received on loan, was of too complicated a design to be suitable for our purposes.

(b) *Economic Botanist.*

17. The Economic Botanist's report is this year mainly administrative in character. Details of scientific work will be published separately in the form of a year book, which will remain as a permanent and easily accessible record.

The most disheartening lack of success pursues the efforts of the Department to hasten the day when it will be able to point to an adequate laboratory equipment. Work had been started and was being rapidly pushed on, when it was discovered that the foundations were unsuitable, and further construction had to be suspended, until a final decision had been come to as to what was to be done. The absence of laboratory accommodation is not so much a matter of importance to the students as to the experts, who are practically debarred from attempting any research work, save during the College vacation, which coincides with the hottest months of the year. But it is only during these two months that they have at their disposal any laboratory or other space that is not used for the greater part of the day by students. The classification of crop species and the conduct of chemical analyses, both of which demand a good deal of space, and undistributed accommodation, are not tasks which can possibly be performed under conditions which demand that all apparatus should be taken up and put away after every hour or two hours' continuous work.

This is particularly unfortunate at the present juncture, when the time seems to have come for the Economic Botanist to devote more of his time to research work and less to teaching. It will, however, be possible for him in future to pay more attention to touring, especially in connection with sugarcane and rice, a crop which especially needs local study under field conditions. In spite of the difficulties experienced, Mr. Graham has done a substantial amount of work on some of the main local crops and has given the demonstration staff a large selection of valuable material to work on.

I would draw attention to the fact, noted by Mr Graham, that local cultivators are appreciating a variety of capsicum introduced by him on the Nagpur Farm. Efforts will be made still further to extend the growth of this variety.

(c) *Agricultural Chemist.*

18. The Agricultural Chemist has been suffering under the same difficulties as the rest of the staff owing to the lack of proper laboratory accommodation. During the year 88 analyses were performed by him or his staff. Important information was also received from Mr. Plymen regarding the adulteration of dairy products and vegetable oils: it is hoped that legislation may be undertaken to prevent the really dangerous malpractices that prevail in the case of milk and *ghi*.

An interesting fact has been elicited regarding the condition of soil known as "linseed sickness". It has been shown that heating or disinfection will render soil that is subject to this affection, again capable of growing linseed. A more detailed notice of the Agricultural Chemist's work will be published in due course in the Departmental year book.

(d) *Entomology.*

19. Further investigation into the damage to wheat by white-ants has shown that the mound-building species do not damage crops. This is caused by a different and smaller species that infest the fields themselves, not their borders, as do the mound-builders. So far no method of coping with the damage has been devised.

The only practical work of local benefit carried out by the Entomological Assistant was an investigation of the possibilities of maize as a trap-crop for the sugarcane borer. I doubt if Provincial entomological work will ever give any results, unless a European Entomologist is posted to the Province: and I also doubt, whether even then, in our present state of knowledge and of public interest in the matter, the results would be worth the extra cost.

(e) *Mycology.*

20. This year, for the first time since 1895, a really wide-spread outbreak of rust, both black and yellow, visited the north of the Province, though not, fortunately, with as much severity as had at one time been feared. On black soil the later sown wheat suffered most, but the crops on light soil were attacked very severely. At Mahgawan, and, by the courtesy of the United Provinces Agriculture Department, at Orai, various kinds of wheat were observed and deductions made as to the type most likely to prove rust resistant. These observations will be verified by further experience in future years. Generally speaking, an early ripening type of wheat, without too much flag, is likely to be the most successful.

(f) *Sericulture.*

21. Our experience in the matter of *eri* worm rearing is as disappointing as our work on *tasar*. This year, for the first time, we have had a serious outbreak of disease among the *eri* worms, grown from seed received from Pusa; and it is also clear that they cannot stand our hot weather after March. The breeding season will thus be a short one, and the profits much more problematical than were at first hoped. *Tasar* continues its disappointing history of disease and infertility. The whole question of silk growing seems to centre entirely in the control of disease: and this problem cannot be elucidated by our present staff. Unless the Pusa Research Institute can undertake to carry out these investigations, it seems a mere waste of time and staff to continue the work of sericulture.

(h) *Cattle-breeding.*

The Powarkhera Farm.

22. The cattle-farm at Powarkhera is now obtaining higher local prices for its bulls than hitherto, two having been recently sold for Rs. 100 each. Though far higher prices are obtained in the Nagpur country, this is a sign that the cultivators of the Nerbudda valley are appreciating an improved type of animal. An outbreak of hæmorrhagic septicæmia was promptly suppressed by the Veterinary Department. If the public come forward to take up the areas of Government forest now under selection for breeding-farms, some increase in the number of cattle-farms in the west of the Province will be needed, and other breeds besides the *malvi* must be made available. The bulls from the Government cattle-farms will be needed to produce the improved type of cattle which it is hoped will be raised on these breeding areas.

The Telinkheri Farm.

23. The Telinkheri Cattle-breeding Farm has again beaten all its previous records financially, by yielding a net profit of Rs. 2,134. Two bulls were sold for Rs. 200 each, the highest price obtained so far by the Department. It is clear that purchasers are more ready than they were to pay a good price for a good breeding animal: and so far as its very limited size allows of, the farm is attaining its object. An outbreak of foot and mouth disease, and another of black-quarter were successfully combated with the ready help of Major Baldrey. A large area of land, some 600 acres in all, is being taken up for the dairy farm, closely adjoining the land of the cattle-breeding farm. As the dairy is only being started on a comparatively small scale, the extra land is being utilised for the present partly as a sheep farm, partly for a small dairy herd, with which experiments in milk production can be carried out, and the rest of it will be leased out to *gaolis* for their cattle. Sheep are becoming an important factor in Chanda. They afford the best and cheapest means of manuring sugarcane: and their wool and flesh-producing qualities can doubtless be greatly improved. The most troublesome problem to face is their liability to numerous diseases of obscure origin, which have never been systematically studied in the plains of India. The flock has begun well and is offering a most interesting variety of ailments for the investigation of Major Baldrey.

The dairy herd has already supplied a small quantity of milk through the contractors: and, as soon as the shed is ready for the *gaolis'* cows and the wire-fencing has been fixed, work will be started on a much larger scale.

The Nawagaon Reserve.

24. The grass reserve at Nawagaon showed a net profit of Rs. 1,506, which is three or four times as much as the price previously obtained from contractors, when it was annually leased out by the Deputy Commissioner. The cutting of spear-grass at an early stage of its growth is the main object of demonstration, and this year the hay found a ready sale among local cultivators, a great contrast to the difficulty experienced in selling it last year. The small Chhattisgarhi cattle fed on the hay are now as large as they are ever likely to be, and in fine condition. But it is clear that if any breeding operations are undertaken in this tract, it will be necessary to introduce a different type of animal. As Mr. Clouston points out, centuries of starvation have evolved a dwarf type of animal, whose one recommendation is that he does his minimum of work on a minimum of food. If we attempt to render available a better animal, we must at the same time demonstrate better methods of feeding, a problem for which, as stated in last year's report, irrigated fodder appears to promise the best solution.

PART IV.—DEMONSTRATION, &C.

Northern Circle.

25. The main feature of demonstration work in the Northern Circle has been the introduction of improved varieties of wheat and *til* through seed farms. A Co-operative Society for the production of pure wheat seed has been started in the Jubbulpore District: its members will have this year nearly 1,500 acres of land, growing improved wheat for seed, in their cultivation. In addition to the dissemination of this improved seed, the society is also making arrangements to market it in bulk, in order to secure advantageous terms from the larger trading firms. Incidentally, it is also hoped that it will produce some effect on the undesirable economic conditions at present existing in the Jubbulpore District, where, owing to the absence of carts and the scarcity of roads, all the trade is carried on by means of pack animals, and the cultivators sell at disadvantageous rates to petty purchasers who visit their villages. The society sold its wheat this year at prices considerably above that obtained by local cultivators, but is reserving the bulk of its outturn for seed. Over and above the farms under the control of this society, there were during the year 600 acres of wheat seed farms in Mr. Evans' circle. The amount of available seed was a good deal affected this year by rust. The type of wheat grown is mainly a soft white bread wheat, which is most in demand with the large firms trading in the Central Provinces.

The yellow *maghai tilli* will be sown during the coming season in 47 villages in Hoshangabad, where the people have agreed to sow no other *tilli* seed but this, to avoid cross-fertilisation. This variety continues to command a much higher price than the local kinds.

Six cotton seed farms have been started in the Nimar District.

The sowing of kharif crops in lines and their intercultivation continued to be demonstrated with success in the Kanthar tract of the Patan tahsil. This practice has now become well established in several villages, which will in future be left to their own devices. The action taken in attempting to introduce improved crops in irrigated areas in Jubbulpore has been described in connection with the Mahgawan experimental plot. It must here be stated that it is a matter of absolute necessity, now that accurate data are in the hands of the Irrigation Department regarding the yield of most of the tanks, that a programme should be laid down defining the areas of the various crops, especially sugarcane, which each tank can irrigate. Such a course is necessary to prevent loss to the cultivators and waste of effort by this Department.

Fairs and miscellaneous work in Northern Circle.

26. During the year nine fairs were held, at which seeds and implements were exhibited and cultivators' exhibits arranged and judged by an officer of the Department in the Northern Circle.

As in the case of cattle shows, prize money has been concentrated on classes of exhibits of real local importance. Fairs seem most successful when held at the large Government farms: and next year the *venue* of the Agricultural Exhibition, which used to be held in connection with the Bheraghat fair near Jubbulpore, will be shifted to the Adhartal Farm.

In addition to his work for the Agricultural Department, Mr. Evans inspected two large Court of Wards estates in detail, and prepared schemes for their management and cultivation. In many other cases, his advice was asked by the Court of Wards, and several managers and *kamdars* were trained on the Powarkhera Farm for the Court. Mr. Evans has also inspected the gardens at district head-quarters in his circle, and has controlled the Pachmarhi and Pagara Government gardens with much success.

The Seoni-Malwa sub-association continued its efforts for the destruction of pig: and other branches were started in the Harda tahsil. Within the space of about a year, nearly 4,500 pig have been slain in this small area. The success of the operations is partly due to the nature of the country, which is open with isolated patches of jungle in which the pig harbour, and to the fact that the money is collected by the people themselves and disbursed by a malguzar or other local gentleman of respectable position, subject to check at intervals by the Revenue staff. Owing to the decrease in the number of pig, the reward has had to be raised from six to eight annas. The same methods, however, did not meet with success in the wide areas of heavy jungle where the pig harbour in Jubbulpore.

Help from District Staff in Northern Circle.

27. The gratitude of the Department is due to the Deputy Commissioners of the Circle for their kind help and advice, and in particular to Messrs. Gaskin, Bell and Hullah. I desire to bring to notice also the good work done by Messrs. Wali Mohammed, Extra-Assistant Commissioner, and Adhuram and Mehar Ali, Tahsildars, in connection with Seed Farms and Agricultural Associations: and, in particular, the great help given by Mr. Shirke, Naib-Tahsildar, Seoni-Malwa, in controlling the operations for the destruction of pig.

Agricultural Associations, Northern Circle.

28. The work of the District Agricultural Associations and their branches continued to progress favourably. The Nimar, Narsinghpur, Jubbulpore, Seoni and Mandla District Associations did good work, while Betul and Chhindwara are beginning to show signs of progress. Sub-associations are now working for Seoni-Malwa, Semri and Babai in the Hoshangabad district; there is a small sub-association in connection with the Powarkhera Farm, and another at Patan in the Jubbulpore District, where others will shortly be started. These sub-associations, dealing with areas of similar circumstance and composed entirely of actual tillers of the soil, have been a surprising success. Their main efforts have been directed to the introduction of improved seed through the agency of seed farms, the destruction of pig, and the sale of implements. A great deal of interest has been awakened in the work of the Department and much local experience gained. The Khandwa District Association continued their experiments in varieties of cotton, with the help of an Agricultural Assistant, who has now been attached to the district for some time and works as their Secretary. This farm is an instance of the good results that can be obtained, if experiments are conducted under departmental supervision and on lines of strictly local applicability. The people have now satisfied themselves by seeing results on their own land and with their own system of cultivation, as to which kinds of cotton are most suitable for their district. Pandit Dajiba Patel Dongri and Dhanna Appa, of Nimar, Ganpat Singh, of Seoni-Malwa, Pulandar Singh, of Narsinghpur, did especially good work as members of Agricultural Associations. A Divisional meeting, at which over 800 visitors attended, was held at Powarkhera during the wheat harvest. Medals and *sanads* were presented by the Commissioner and the visitors were entertained afterwards by Mr. Evans, the Deputy Director of Agriculture. The oil-engines and other machinery shown by Messrs. Burn and Company's representative, the reaping machine, and the selected varieties of wheat aroused much interest.

29. The most arduous and important task on which the Department is at present engaged is the extension of improved methods of rice growing in Chhattisgarh. We have to induce the cultivators to take water from our tanks, as a matter of regular practice and, at the same time, add to their annual profits. The objects and methods of this work have frequently been described in annual reports and elsewhere; I forbear to enlarge on them further here, and will confine my remarks to one or two features of special interest during the year under report. No very large increase was accomplished as compared with the preceding year, the area actually transplanted being only some 6,900 acres. The reason is, that in this respect we stand or fall with the Irrigation Department. Owing to various reasons, including local intrigues, and certain apprehensions of the people roused by the progressive increase in water rates, many cultivators who had promised to transplant, refrained from entering into agreements with that Department, and the result was that only about half the area anticipated was actually transplanted. We cannot arrange to supervise transplanting in a number of scattered villages at a moment's notice; we make all our arrangements in advance, and therefore we can only work with cultivators who decide in advance to take water. And it is obviously too late to induce people to transplant, once the sowing has been done. Thus, all who transplant irrigate, but all who irrigate do not necessarily transplant. This year, however, a new system has been introduced. The assistance of the Land Record staff has been obtained on the lines sanctioned in Secretariat letter No. 582—XIII-4-8, dated the 20th November 1911, and the *patwaris* and Revenue Inspectors are supervising work in many circles, with the help of trained *kamdars*. So far as the latest reports show, an area of some 15,000 acres is now under transplantation. The urgency of this work increases every year, with the nearer approach of the day when the Mahanadi and Tandula projects will be ready, and it is one of the most important tasks of the Department to induce the people to accept beforehand improved methods over as large a proportion as possible of the area which will eventually be commanded by these works.

Rice in Chhattishgarh.

30. A question has arisen in connection with the employment of the Departmental staff on demonstration, that may greatly affect the future working of the Department. We are employing assistants in many cases to do work that can be done as well, or even better, by *kamdars*. The first named is a man who has been three years at College, and is probably drawing Rs. 40 to Rs. 100. The *kamdar* is seldom paid as much as Rs. 25; he is of a cultivating caste, is often literate in Hindi, and able to control coolies. It seems to me that we are perhaps trying to use too expensive an instrument for too coarse work; and, while utilising the field of demonstration as a valuable training ground for young assistants, we might find it possible to employ them, when they have gained experience, where their expensive training would be of more advantage. There are arguments on the other side, however: and there is some reason to doubt if the best College training we can give sends the students out into the world with a mental outfit of real thoughtfulness and originality. A power of control, experience of work under local conditions, and a knowledge of English is all that we can expect from our men at present, and so long as this is the case, the degree of responsibility that can be entrusted to them must needs be limited. The matter is not one that can be hurriedly decided The organisation of the Department is necessarily in a state of constant change, and working principles which were accepted by us a few years back are frequently modified or abandoned.

Employment of *kamdars*.

31. Turning to the details of general demonstration work, a large area is now being brought under ground-nut, and an appreciable export will spring up in a year or two. This crop was unknown in most parts of Chhattisgarh till 3 or 4 years ago. Oil-cake has begun to be ordered on a small scale for sugarcane by local cultivators for the first time, and the Raipur oil mills are raising their rates. The same firm have set up the bone-crushing plant worked experimentally by the Department last year: and are already filling a few orders at prices vastly more advantageous to the cultivators than could be obtained in Calcutta or Bombay. There is a great saving in grinding the bones locally, instead of railing them 1,200 miles to

General demonstration work in Chhattisgarh.

Calcutta and back: and the profit from bone dust is so great that its use will shortly become a popular practice among certain classes of cultivators. For the first time, too, Chhattisgarh cultivators bought iron cane mills, 15 of which were sold locally. The cultivation of improved varieties of cane has made a good deal of progress in the last two years. There were considerable gatherings of cultivators on the Raipur farm for the Divisional Meeting and at the cattle show in January. Prizes were awarded at the first meeting for cane and ground-nut, and, as an instance of the great improvement of cane cultivation effected, I may mention that a considerable number of exhibits of thick cane averaged 6 lbs. weight per stripped cane. At the cattle show, too, the prizes were also given on lines which tended to encourage improvement rather than merely to reward wealthy men for bringing expensive animals, the usual fault of local shows in the Province. Mr. Tundilal, Extra-Assistant Commissioner, continues to do excellent work, and received the title of Rai Sahib during the year. I cannot conclude this notice of demonstration work in Chhattisgarh without expressing the obligation of the Department to Mr. Crawford, Deputy Commissioner of Drug, for his assistance in many branches of our work.

Demonstration work with Nagpur Division.

32. The principal lines special to this Division are sugarcane, rice and ground-nut. There are three cotton seed farms in the Nagpur and Wardha Districts, but these have already been fully noticed when describing the work of the Berar Division. Chanda, with its mild winters, and large tanks, seems to offer a surprisingly fine field for sugarcane. Yields of 46 and 50 tons of stripped cane per acre are very seldom heard of in India: but from the results attained on Court of Wards' land, with not very satisfactory seed and under divided control, it seems likely that these yields will be considerably surpassed on our own land.

About 70 acres of cane were grown this year by cultivators under the Ramtek tank, where three years ago no cane was grown at all. Had the seed been available, this area could have been doubled, thanks to the success of the past two years' demonstration work, and the tactful assistance of Mr. Lakshmiprasad, Tahsildar of Ramtek. Unfortunately, a considerable amount of red rot was found in the Raipur cane, and thick cane seed could not be found for many applicants. Practically the whole of this area was grown on lines never seen in the Central Provinces before, though well known in regular cane-growing areas, such as Madras and Poona. A top dressing of cake was given, and *takavi* for this and for the proper cultivation of the cane was advanced through the agency of the Department. A certain amount of cane was also grown under the large tanks in the Bhandara District, and our seed was eagerly taken, wherever it could be spared, in numerous villages in Chanda.

The cultivation of late and heavy yielding rice is being pushed as much as possible in the Ramtek area—the coming year should show a fair area under *gurmatia*. It is hoped that the large yield of this variety will encourage its growth on an extended scale next year. Three Agricultural Assistants have been doing their best in this area throughout the year: and the next two years should, in the absence of untoward accidents, see a large increase in sugarcane and irrigated rice. I am unable as yet to make any definite predictions as to the future of irrigated wheat.

An important matter in the Chanda District is the damage from pig. The extensive and frequent areas of heavy jungle found all over the district prevent the plan so successfully tried in the Hoshangabad District from being of much use there: but, so far as can be judged from the experience of one village over a single season only, a type of fence has been found which the pig have so far failed to penetrate. For expensive crops like cane and ground-nut, a fence of this kind is simply invaluable; and it will this year be tried on a more extended scale by Government, as well as by some private cultivators. Local farmers are confident that this fence will keep out pig, and are anxious to buy it at once, though it costs Rs. 800 a mile.

An option for a sugarcane factory area, commanded by the Ghorajheri tank, was granted by the Administration during the year to Mr. J. McGlashan of Cawnpore. It is hoped that a good start will have been made by 1913 in the

preliminary work. A good deal of labour in selecting areas and the working out of conditions for the supply of water, in consultation with the officers of the Public Works Department, fell on Mr. Clouston in connection with this project.

Agricultural Associations in the Nagpur Division, though containing many members who do excellent work as individuals, do not yet show signs of possessing as much corporate sense as in some other districts. It is hoped that a third Deputy Director of Agriculture may be posted to the Province during the coming year: if so, Mr. Clouston will be able to devote more time to this important matter.

Demonstration Work in Berar.

33. The work of the demonstration staff in Berar practically centres round the cotton seed farms. There were 40 farms here during the year under report, a number which has been largely increased this year in response to an urgent popular demand. The Department is running some risk in attempting this with its small supervising staff: but with the strong hopes that exist of an increase in strength in the immediate future, it was thought best to stretch a point in meeting a *bonâ fide* public need.

The farms, which do not as a rule exceed 20 or 25 acres in area, produced 343,000 lbs. of seed, of which $\frac{4}{5}$ was *rosea*. This sells at three times the bazar rate for cotton seed. To provide the whole of Berar with seed every year would need nearly 1,000 such farms. Even supposing the farmers changed their seed only once every four years, the number of farms required would be more than the Department could properly supervise. A scheme has been devised by Mr. Standen, C. I. E., Commissioner, Berar and Ex-Director of the Department, and Mr. Clouston, Deputy Director of Agriculture, Southern Circle, for introducing a system of large seed farms, financed by private funds, as an intermediary step between the central farm at Akola and the small private seed farm, and its general lines are now under discussion. The Department welcomes the establishment of a co-operative seed society by Mr. V. G. Kulkarni at Gaigaon. Co-operative societies are bound to take a very important part in the mechanism for introducing improved seed to the cultivating public. There is but little evidence of cross-fertilisation of cotton in Berar, but there is at present a considerable risk of admixture from the fallen seed of the previous crop and from cattle manure. These causes of impurity will tend to disappear as the area under a single type increases.

Buri, as explained elsewhere, will never be the leading type of cotton for Berar in spite of its long staple: but there is always likely to be a fairly large area sown with it. This year 224,000 lbs of the lint were marketed through the agency of the Department, though the nature of the season was not favourable to the crop. Four of the oil-engines purchased by owners of private seed farms were at work during part of the season The arrangements made by Messrs. Burn and Company with the help of the trained *mistri* belonging to the Department will, it is hoped, suffice for the present to keep them in good working order: but the continued demand for more expensive implements will soon make the demand for an Agricultural Engineer a question of practical politics.

Operations were continued for the capture of the herd of wild cattle at Saguda: 19 were found wandering about by the public and caught and sent to the pound last year: and this year, *khedda* operations were undertaken under the personal supervision of Mr. Clouston, the Deputy Director of Agriculture, with the result that 35 valuable animals of the Khamgaon type were caught between May and July 1912. This work involved considerable personal risk and exposure during an unusually inclement hot weather: and the thanks of the Department are due to Mr. Maniram Deshmukh for his assistance, as well as to the local officers of the Forest Department.

The annual distribution of rewards, consisting this year of medals and *sanads* to gentlemen who have been conspicuous in their efforts for the improvement of agriculture, was made by Mr. F. G. Sly, C. S. I., Commissioner of Berar, at the Divisional Meeting, which was, as usual, well attended.

34. The Agricultural Associations continued to do good work. Two of them, Buldana and Amraoti, now levy subscriptions from their members, which they devote to prizes for exhibitions of cotton. Most of the members render active help in various ways by managing seed farms, selling implements or supplying information regarding the condition of the cotton crop. A very important departure was taken this year in respect of the cotton forecast. Though the responsibility for this still remains with the Director of Land Records, who controls the chief reporting agency, the assistance of the Agricultural Department was invited in respect of the cotton crop. The system devised by Mr. Clouston, Deputy Director of Agriculture, under which the Department's forecast for Berar was compiled this year, seems to have given a fairly close approximation (within 1 per cent) to actual results. It consists, briefly, in estimating the number of villages in each district, containing a good, average and bad crop, respectively: in selecting a number of typical fields from each of these classes, and counting the number of buds, flowers and bolls per acre. As many pickings as possible before the returns have to be sent in are taken from each of these fields, and the bolls so picked are weighed and counted. With a due allowance for flowers that fail to set, a sum in proportion will then give the amount of cotton that may be expected from fields of the type selected. More information is required about the effect of rain on the setting of flowers: the District average yields are no doubt capable of more accurate estimation, and a body of experience requires to be built up to enable a proper classification by outturns of the villages to be made: but it is hoped that, as time enables us to overcome these difficulties, a considerable improvement in forecasting will be possible.

Agricultural Associations in Berar.

I have to express the gratitude of the Department to Messrs Sly and Standen, Commissioners of Berar, for their help and advice during the year, and to their Deputy Commissioners for their continued interest in the working of the Department.

PART V.—AGRICULTURAL ENGINEERING.

35. The Powarkhera depôt sold 134 machines this year, mostly winnowers manufactured at the Rasulia Mission Workshop; 5 cane mills and 12 ploughs were sold at the Mahgawan Farm. A considerable number of improved cane mills and other machinery were sold by private firms in response to a demand created by the Department, which welcomes any signs of the replacement by private enterprise of its functions as a machinery seller. A reaper of a suitable type for local use has been received and successfully cut nearly all the wheat crop on the Powarkhera Farm. The work was seen by a large number of cultivators who generally approved of it. The main drawback to it from their point of view is, that it will not cut gram, which is largely grown mixed with wheat in the Northern Circle. But the cost of labour for reaping has increased so enormously of late years, that a satisfactory reaper is certain to find a ready market. The cost of the present machine landed in Bombay is Rs. 200 and drawn by an average pair of local bullocks it will cut 7 or 8 acres of wheat a day.

Northern Circle.

An oil-engine of the Gardner type, which the Department has adopted as its standard at present, has been set up on the Powarkhera Farm: and one or two similar sets have been purchased by cultivators and are being successfully worked for pumping and ginning. If these engines continue to give satisfaction, there will be a good demand for them in Nimar, Betul and Jubbulpore. The winnower devised by Mr. Evans and Mr. Cove, Head Master of the Nagpur School of Handicrafts, is now being made by the Rasulia Mission Workshop. It is really only a blower, but its very low price appeals to the local cultivator. Further improvements are being effected in the drill invented by the last-named officer, and it will soon, it is hoped, be suitable for general introduction. Co-operative Credit Societies in the Sehora tahsil of the Jubbulpore District helped several cultivators to buy improved implements.

36. The sale of implements or parts of implements in the Southern Circle rose to 549 during the year. The main demand is for turn-wrest ploughs, of which 208 were sold in the Berar Division alone. Seven oil-engines and 13 gins were also sold, as well as 87 Akola hoes. The appointment of members of the Agricultural Associations as honorary agents gave a great impetus to the sale of implements. Cane mills sold well in the Wainganga tract.

Southern Circle.

PART VI.—PUBLICATION AND DISSEMINATION OF AGRICULTURAL INFORMATION.

37. The *Agricultural Gazette* still maintains its popularity. Its subscribers increased from 5,865 to 6,000. During the year it was enlarged by the addition of a section on Co-operative Credit, and its title was changed to the *Agricultural and Co-operative Credit Gazette*. This increased its size and the cost of production, though the effect on its circulation has been hitherto very trifling. Facilities for bringing the work of Co-operative Credit before the Agricultural public, however, have been immensely improved, and the step is in accordance with the policy of the Agricultural Department, of keeping in close touch with the work of Co-operative Credit, and of regarding the Co-operative Societies as the future means through which fresh agricultural ideas will most readily reach the people.

The *Gazette* was hitherto self-supporting: but it is possible that its small margin of profit may disappear in the cost of the extra pages.

PART VII.—MISCELLANEOUS.

38. The record of the Nagpur Provincial Museum is one of continued progress. The collection of birds is beginning to show signs of being worthy of the reputation of the Province, with its rich store of wild life. But lack of space is now making itself felt: and it will be impossible to go further with this work, to say nothing of making any attempt at exhibiting any of the larger and, from the popular point of view, more attractive specimens, unless more room is made available. A note on the whole question of Museum accommodation has been submitted for the consideration of the Local Administration.

In the Archæological section, some Buddhist remains have been received, from the Jubbulpore District, the first specimens of this period possessing any real merit or interest. The preparation of a descriptive list of the exhibits and of a brief *résumé* of the ancient history of the Province, with special reference to the contents of the Archæological section of the Museum, and to the more important remains in the Province generally, is well advanced and the work will, it is hoped, soon be published. The Miscellaneous section, which has always been a stumbling block in the way of any really systematic arrangement of the Museum will, if space becomes available, be re-arranged as an anthropological section. In this all existing exhibits of value or popular interest will be able to find a place.

Mr. D'Abreu, the Assistant Curator, has continued to do very good work; and Mr. Graham, the Honorary Curator, has supervised the Museum with judgement and keen interest.

The number of visitors continues to show a substantial increase, and the Museum is rapidly taking its place as a most popular place of report for Indian visitors.

39. The Raipur Museum attracted only 72,222 visitors against 90,512 last year. The decrease is due to plague in the town. The Curator, Central Museum, Nagpur, visited this Museum during the year, and made a few useful suggestions, among which was the purchase of a number of Poona figures, a popular feature of the Central Museum.

The efforts of the District Council to spread the use of the improved hand-loom, in connection with the Museum, seem to have had but little result. I have thought it best not to commit the Department to any responsibility for this work, until we obtain a textile expert. Working on wrong lines, as has often been pointed out by me, is not only a waste of money, but discredits genuine efforts on right lines. We know, from the experience of other provinces, how to go about the task: and we also know that spasmodic efforts, without expert guidance, are certain to fail.

C. E. LOW,

Director of Agriculture and Industries,

Central Provinces and Berar.

Govt. Press, Nagpur:—No. 1161, Dir. of Agr.—9-9-12—530.

REPORT

ON THE WORKING OF THE

DEPARTMENT OF AGRICULTURE

OF THE

CENTRAL PROVINCES

FOR THE YEAR

1912-13

Agents for the Sale of Books published by the Central Provinces Administration.

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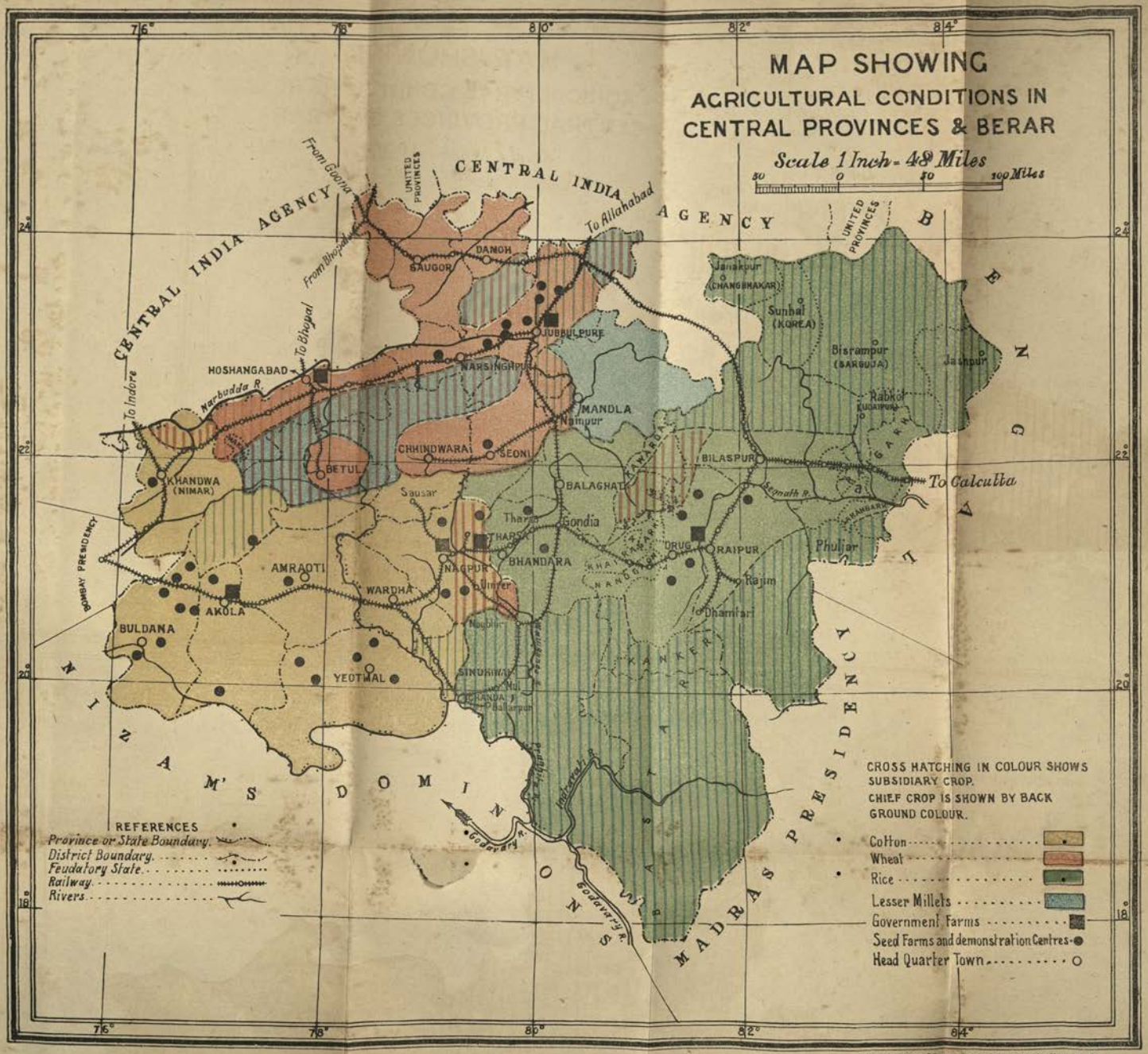

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No. 693
XIII-18-17.

CENTRAL PROVINCES ADMINISTRATION.

Agriculture Department.

Nagpur, the 15th November 1913.

READ—

Report on the Department of Agriculture, Central Provinces, for the year ending 30th June 1913.

RESOLUTION.

The operations of the Department of Agriculture were conducted during the year on lines that have already proved successful, and not much was attempted in the way of innovation. But the report contains abundant evidence of expansion in the existing field of operations, and the officers of the Department are to be congratulated on the manner in which they coped with their task. With only two Deputy Directors, the absence of one on leave necessitated that his charge should devolve temporarily on the Principal of the College, in addition to his own duties, and the Chief Commissioner can testify, after personal experience, to the efficient and whole-hearted manner in which this officer, Mr. Allan, acquitted himself of his double charge. The necessity of increasing the superior staff has been strongly urged by the Administration, and the cadre has been recently increased by a Deputy and an Assistant Director, of whom, however, it has been found possible to recruit only the former. Until the cadre of European experts has been filled, and the new arrivals have had sufficient training under local conditions to enable them to undertake responsible work, it is absolutely necessary for the Department to call a halt. With the present staff, however capable, it would, the Chief Commissioner thinks, be dangerous to attempt to open up any fresh lines of work; the internal growth of the schemes already in progress, and the further improvement of the farms at present existing, will more than suffice to occupy fully the whole available energies of the Department. Our agricultural population, in spite of natural shrewdness, is after all to a great extent uneducated and hesitating, and would be only too easily prejudiced against our whole policy of agricultural improvement by one of those failures which arise from inadequate supervision.

2. The problem of obtaining boys of the true agriculturist castes, with the necessary standard of education, for admission to the Agricultural College, and subsequently to the Department, is still as difficult as ever of solution. It seems that boys must be encouraged from an earlier stage than that at which they are at present recruited, and the Director is now working out a scheme for selecting boys of agriculturist castes from the Primary and Middle Schools, and encouraging their general education by the aid of scholarships. The experiment will be an interesting one, and the Chief Commissioner particularly desires that it shall receive close attention from District Officers, on whose assistance and local knowledge the Director will have very largely to rely. At present many students at the Agricultural College cannot attain a reasonable standard in the more scientific and less practical subjects, but the Principal has now introduced a revision of the time-tables, which, it is hoped, will effect an improvement in this direction. The Chief Commissioner is glad to learn that Veterinary science is to receive increased attention in the revised scheme. With the general management of the College Sir Benjamin Robertson is fully satisfied: its healthy tone and neat appearance are highly creditable, and discipline is thoroughly satisfactory.

3. An innovation during the year was the introduction of a course for the training of junior members of the Indian Civil Service in Agriculture, and the Chief Commissioner understands that the course was followed by them with keen interest. These courses will be continued, and all junior members of the Civil Service, except those already under training for the Judicial Department, will be required to attend them.

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4. A great variety of work is being done on the eight Government farms, and the Chief Commissioner, who has found opportunities of personally inspecting several of them, is satisfied that not only are their experimental functions most usefully performed, but also that as a means of demonstration they are centres of genuine interest to the agricultural population of the tracts which they serve. On the whole the season was not a very favourable one, but nevertheless very successful results were achieved. In particular the Akola cotton farm again paid a handsome profit, and that in spite of seasonal conditions which were somewhat adverse to success. The new Adhartal farm at Jubbulpore, by the interest that it has already aroused in the Jubbulpore Division, has fully justified its establishment. Another recently established farm is the somewhat remote one at Sindewahi in the Chanda district. Its main purpose is to demonstrate the possibilities of irrigation in a tract on which the Government is spending large sums on tank schemes and in which the soil is particularly suited to the growth of cane. These Provinces are as yet of little importance in the matter of sugar production, but the extension of cane-cultivation in Chanda is a most promising scheme, and a lease of land has recently been sanctioned in favour of a Company for the growth of the crop and the establishment of a central factory.

5. There are now few tracts in the Provinces in which the ubiquitous energies of the Deputy Directors, Messrs. Clouston and Evans, have not achieved very substantial results, and the Chief Commissioner notices with great satisfaction the extent to which they have been assisted in their efforts by non-official gentlemen with a close personal interest in practical agriculture. The establishment of private seed-farms, for producing pure strains of cotton, til and wheat, proceeds apace, and it is now not possible to give many of these more than general supervision. But here the co-operative movement is proving itself a most useful ally to agriculture, and the cohesion and discipline which are among its essential factors minimise the risk of failure attendant on individual backsliding from the high standard of effort that is required as a condition of departmental assistance. Agricultural Unions are being formed, which not only engage to abide by rules issued by the Agricultural Department, but also pay for the services of practical agriculturists trained on the Government farms. In the Sihora tahsil of Jubbulpore, enterprise on these lines is already achieving a considerable measure of success; a similar movement has been started in Betul, while in Berar some twenty-five Unions have been recently started. The substantial and enterprising agriculturists of Berar now need little encouragement to grow almost exclusively the profitable *rosea* variety of cotton, but perhaps the most gratifying success of the Department is that achieved among the backward and hitherto stagnant population of Chhattisgarh. Here the cultivation of rice by transplantation, in place of the old lazy and wasteful methods, is advancing at a rate which gives reason to hope that, by the time that the canals now being constructed in that Division are in working order, the people will have learnt to turn to the most useful advantage the benefits which these canals will offer to them.

6. Cattle-breeding at Telinkheri and Powarkhera was successful in the quality of, and the prices obtained for, the stock produced, but the herd at the former place was somewhat seriously reduced by a severe outbreak of tick-fever and liver-fluke. The causes of the latter disease could not reasonably have been foreseen, but the outbreak of the former could, the Chief Commissioner thinks, have been prevented by closer attention to the cleanliness of the stalls. The occurrence of these outbreaks is practically the only flaw in a year's otherwise efficient management. A modest but promising beginning has been made in the matter of starting private cattle-breeding farms, and it is particularly satisfactory to notice that Chhattisgarh, where the local cattle are miserably undersized, is the locality in which several of these ventures have been started. There is no object to which landlords of substantial means can more usefully devote their time and money.

7. Recent enquiries have revealed the extremely unsatisfactory nature of the milk-supply in towns, but improvement is a matter of extreme difficulty. It is obvious that Government cannot maintain and manage numerous dairies: Municipalities might do something, but education and public opinion must be the ultimate factors in bringing about better conditions. The new dairy farm attached to the Agricultural College at Nagpur affords an interesting

object-lesson at Nagpur to anyone who is interested in the subject, and the Chief Commissioner is glad to learn that it is already attracting considerable interest. During the year a larger dairy farm for the sale of milk and milk-products to the public has been opened at Telinkheri, near Nagpur, by a private contractor, under conditions which ensure Government assistance and supervision, and the Gaolis, who own the cattle, have been formed into a co-operative society. The scheme has so far proved successful in spite of very considerable difficulties; its benefits are greatly appreciated by the public, and the Chief Commissioner regards its continuance as of the utmost importance.

8. Attempts at sericulture have never been successful in these Provinces, and last year's report foreshadowed their discontinuance. They were continued during part of the year, but have now been discontinued as impracticable. The Chief Commissioner accepts the Director's view that, under the climatic conditions of the Provinces, the culture of *eri* silk cannot be profitable, and that it is useless to attempt to foster it as a village-industry.

9. The District Agricultural Associations are now being reformed on lines which will concentrate their work on prescribed and smaller areas with definite objects in view, and there can be no doubt that the reform is rendering them more useful and practical. In their earlier and less definite constitution they were useful as a means of bringing officers into touch with persons interested in modern agriculture, but now that their more enterprising members have become known, their efforts will not suffer by becoming more concentrated and less diffuse. Four of the farms are now centres at which annual Divisional meetings are held. Sir Benjamin Robertson attended some of these meetings during the year, and was much impressed by the large attendance of cultivators, many of whom had come long distances, and by the keen interest they displayed in the proceedings. These meetings are used as an opportunity for discussing local problems and for active demonstration of measures and methods recommended. In some cases the meetings have also been made an occasion for the public recognition of services rendered, or results achieved, by practical agriculturists.

10. With the hearty co-operation of mill-owners, press-owners and market-committees, the Director has introduced a return showing the number of cotton bales pressed and of carts arriving at markets every week throughout the Provinces, and it is hoped that these returns, which are published with great promptitude, will be of interest and value to persons interested in the trade.

11. The building of the new laboratories at Nagpur is rapidly progressing, and on their completion the Economic Botanist and Agricultural Chemist will work under less difficult conditions than at present. Messrs. Graham and Plymen are engaged on work which, being of a highly technical nature, comes little to public notice, but it is none the less useful on that account, and the Chief Commissioner would take this opportunity of expressing his appreciation of its value and of the efficiency with which it has been performed.

12. The office of Director was held for half the year by Mr. Low, who left to his successor, Mr. Wills, a very full scheme of work in full progress. To both of these officers the Chief Commissioner desires to express his thanks for the capable manner in which they have administered the Department and for the remarkable degree to which they have aroused and maintained public interest in its operations.

ORDER.—Ordered that a copy of this Resolution, together with the enclosure, be submitted to the Government of India in the Revenue and Agriculture Department, that copies be forwarded to the Director of Agriculture and Industries and to all Commissioners and Deputy Commissioners, Central Provinces, for information and guidance, and that it be published in the Supplement to the *Central Provinces Gazette*.

J. HULLAH,

Third Secretary to the Chief Commissioner,
Central Provinces.

Govt. Press, Nagpur :—No. 1481, Civil Sectt.—18-11-13—602.

REPORT ON THE WORKING OF THE DEPARTMENT OF AGRICULTURE, CENTRAL PROVINCES, FOR THE YEAR 1912-1913.

PART I.—ADMINISTRATION.

Mr. Low held charge of the office of Director of Agriculture during the year under report up to 16th January 1913, when he proceeded on leave, and was succeeded by Mr. Wills, who held charge till the end of the year.

Mr. Evans continued to hold charge of the Northern Circle throughout the year. Mr. Clouston was in charge of the Southern Circle up to the 10th April 1913, from which date he proceeded on leave and was succeeded by Mr. Allan, who has been very heavily worked in charge of the Southern Circle, in addition to his own duties as Principal of the Agricultural College, Nagpur. There were no changes among the rest of the superior staff.

Rai Sahib Tundilal continued to hold charge of the Chhattisgarh Division except for a short period of one month in April 1913, when he proceeded on privilege leave. There was no change in the Wainganga and Nerbudda Divisions, where Messrs. Hiralal and Nandkishore continued in charge.

Mr. Bhayyalal, who occupied the position of Farm Superintendent, Akola, and acted, in addition, as Superintendent of the Berar Division, was relieved of the charge of the farm with effect from the 1st April 1913 and appointed solely as Superintendent of Demonstration in the Berar Division.

The total expenditure of the Department during the year was Rs. 4,58,000 as compared with Rs. 4,79,000 of the last year.

2. The power conferred on the Deputy Directors of Agriculture in regard to the countersignature of contingent and travelling allowance bills has resulted in a great saving of time.

The effect of bringing the whole ministerial staff of the Department on one cadre has worked well, but the question of having a separate ministerial cadre for the establisment employed on the farms is now under consideration.

3. Mr. Low visited all the farms during the year, and also visited 12 district head-quarters. He made a special tour round Rajnandgaon, Chhuikhadan, Gandai and Kawardha in connection with the inspection of cotton areas in Chhattisgarh, and as the result of his tour, proposals are now under consideration for the establishment of a farm for long-staple cotton in West Chhattisgarh. Mr. Wills visited seven farms during his tenure of office.

PART II.—AGRICULTURAL EDUCATION.

4. The year's entry of new students at the Agricultural College was numerically disappointing, owing to an unusually large number of candidates who did not appear after permission for admittance, or who, after arrival, soon abandoned the College. There are always a good many faint-hearts. The number of first-year students who appeared for examination at the end of the year was finally only 14 as compared with 24 in the previous year, but they included a somewhat larger proportion than usual of true agriculturists, and the degree of success achieved by them at the examination, though only fair, was at least as good as was attained in the previous year. In the final examination for the degree 13 students out of 16 passed, but again only one was placed in the first class.

As usual, failures were most frequent in the more scientific and less practical subjects, to which the students do not devote proper attention, but this defect has doubtless been also caused in the past by too great diffusion of the time spent on various subjects. As was foreshadowed last year, the scheme and time-table now concentrate agriculture mainly over the latter period of the course, devoting the earlier portion of it to subjects like Botany and Chemistry,

with their attendant training in methods of thought and observation. Veterinary work, in which the standard attained has hitherto been very unsatisfactory, has now been made a major subject, on which attention is concentrated in the last year of the course, thus making the students realise more fully its importance. The full effect of these changes is not, however, yet apparent, as only the first year's students have been brought under the new scheme, and it will take two more years for its complete introduction.

5. Although failures are most frequent in the more scientific subjects, there can be no question of lowering the educational standard required for admission to the College, *i. e.*, the School Leaving Certificate or the Matriculation. Experience shows, as the Principal remarks, that unless a student has reached this standard, his chance of getting successfully through the College course is almost negligible: on the other hand, to lower the standard would make the College degree of little value. The subject is closely bound up with the difficult question of securing boys of the true agricultural classes as our students. All efforts in this direction have hitherto been rather discouraging, especially in the Northern districts, which, with their old-established and often excellent landlord class, might be expected to supply us with the best material. The number of scholarships tenable at the Agricultural College, in granting which preference is given to the sons of agriculturists, is now being increased from five to eight, but experience shows that we must work up our material from a lower period than the school-leaving age. It is now proposed to introduce a system of scholarships to be given to promising agriculturist boys as soon as they leave the Primary Schools, tenable throughout the Middle and High School courses, with due safeguards to ensure that their holders shall enter the Agricultural College on attaining the necessary educational qualification. Definite proposals are now in course of submission to the Local Administration. The experiment will be an extremely interesting one, but at least seven years will be necessary before even its initial success can be gauged. In the matter of selecting the boys and watching their progress after they leave the Primary Schools, we shall rely very largely upon District Officers for close and personal assistance, and the scheme will be specially commended to their care.

6. Discipline in the Hostel has been thoroughly satisfactory. The new gymnasium has been completed and is well attended. The buildings are kept in an excellent state of cleanliness, and continued progress has been made in improving their surroundings. The health of the students was good during the year, and there was no serious illness of any kind. Mr. Allan is to be congratulated on a thoroughly successful year's management.

The College Dairy Farm.

7. The College Dairy Farm has now passed through its first complete year, and the results are most encouraging, although the herd is not large enough for the outfit, and contains some cows of very poor quality, which will be got rid of as unprofitable. The buffaloes, obtained from Delhi, Surat and locally, are much better. The equipment is now almost complete, and the dairy, which is attracting much local interest, is well worth a visit. Attention is devoted to milk-products, especially butter, rather than to whole milk, though the latter is the more paying commodity. There is a brisk demand for the produce of the dairy, which already almost pays its way, including depreciation and interest charges. The enlargement and improvement of the herd should firmly establish the dairy as a paying concern, and it may be hoped that its educational effect will extend considerably beyond the students of the College.

Training of junior Civilians in Agriculture.

8. It has been decided by the Local Administration that all junior members of the Indian Civil Service shall go through a short course of training in agriculture, and this course was held for the first time in the autumn of the year under report. It lasted for about three weeks, and consisted of a course of lectures at Nagpur, supplemented by practical demonstration on the Nagpur, Telinkheri and Raipur farms. The junior Civilians, who had just completed their first or second year's service, were put through the course, which was followed by an examination. The course was certainly a success, and it has therefore been decided to adopt the

scheme as a permanent measure, but it entails a great deal of extra work on the officers of the Department at a very busy season of the year, and the course will therefore in future be held biennially.

Short courses of instruction.

9. At Powarkhera and Raipur the short courses of instruction for practical agriculturists were continued. The Raipur course, being practically confined to the transplantation of rice, is held during the rains, and was attended by 17 men. At Powarkhera there are three courses during the year, where instruction is given in the agricultural operations of the particular season at which the course is held. The courses were attended by 27 men, including three from Bhopal. As agricultural conditions vary greatly from district to district, it has been found most convenient and useful to confine each course, as far as possible, to pupils from a single district. These courses have also been started at the newly established farm at Adharial near Jubbulpore, but lack of accommodation, which is now being provided, prevented the admission of many pupils. Four servants of malguzars were, however, trained. Much longer courses of instruction are given to men whom it is proposed to employ as kamdars on the Government establishment.

PART III.—Research and Experiment.

(a) *Agriculture.*

The Nagpur Farm.

10. At the Nagpur Farm the seasonal conditions in the earlier and more important part of the year were particularly unfavourable. A very belated arrival of the monsoon was followed by a short period of excessive rain in July and August, and thereafter by a somewhat anxious period of drought. The lateness of the monsoon rendered practically ineffective two of the most interesting experiments which are being tried, namely, the green-soiling of land and the testing of an early variety of soy-bean, which up to the present appears to be the most profitable yet tried, as it can be followed by a crop of wheat, whereas the later-maturing varieties occupy the ground for four or five months. Welcome rain was received in September, and the rabi-crops did better, gram and linseed in particular being excellent. There was no noteworthy change in the scheme and series of experiments or in the course of practical instruction given to the students of the College.

11. As a preliminary to the scheme of opening a large sewage farm for the sewage of Nagpur City when the new drainage scheme is complete, sewage experiments were started on a small area of five or six acres of the Nagpur Farm. The supply is obtained from a small experimental plant which pumps up to the farm the sewage of a number of Government offices and the Agricultural College, and the object of the experiment is to test the effects of sewage in different forms on black cotton-soil similar to that on which the new sewage farm will be placed. Up to the present the sewage has been received in too dilute a condition, and proposals are under consideration with a view to strengthening it.

12. The Nagpur Farm, being mainly instructional in its purpose, always shows a very large excess of expenditure over receipts, but during the year under report the percentage of receipts to expenditure rose from 23 to 29 per cent.

The Powarkhera Farm.

13. The enlarged Powarkhera Farm, near Hoshangabad, has been improved by the construction of embankments to prevent erosion, and by the eradication of weeds and deep-rooted grasses. At this farm, as at Nagpur, the kharif season was very unfavourable, the cotton and til crops producing only fair results. Of the various cottons tried, the Saugor yellow-flowered *jari* seems to promise well in this tract, where the winter nights are too cold for the most prolific Berar varieties. An Aligarh white-flowered variety gave a good outturn; it closely resembles the Berar *rosea* and will be grown on a larger scale this year. Belated and thereafter excessive rainfall spoilt the *purvi* variety of *maghai* til, which is one of the best products of this farm.

The main purpose of the farm is concerned with wheat, and for this and all other rabi crops the season was excellent. For the second year in succession, however, rain in November, though greatly benefiting the rabi crops generally, prevented further progress in the experiments in wheat irrigation. The early watering was not given, and the later one, though given, was really unnecessary. Only selected varieties of wheat were sown, and the outturns were large, a plot of *bansi* giving over 1,500 lbs. an acre. Receipts amounted to Rs. 5,163 and expenditure to Rs. 10,286, but the adverse balance was really much smaller than these figures would indicate. A stock of seed worth Rs. 867 was purposely held over for sale after the close of the year. On the other hand the expenditure side shows a heavy item of Rs. 2,532 on account of the pay of kamdars and farm-servants, many of whom are largely employed on demonstration work elsewhere in the circle, though their pay is all charged to the farm.

The Adhartal Farm.

14. The great degree of interest shown by the public in the newly established Adhartal Farm, on the outskirts of Jubbulpore, shows the genuineness of the popular demand which led to its establishment. Although it has been open for little more than a year, it has already become the centre of all agricultural demonstration and research for the whole Division, and the great variety of work in progress goes far beyond the originally intended main purpose of the farm, namely, the methods of cultivation best suited to the areas under the small irrigation tanks recently opened in Seoni and the Northern districts.

Conditions were unfavourable to success, owing to a defective monsoon, followed later by hail and rust in the rabi season. These unfavourable features were not, however, wholly unprofitable, as they served to demonstrate the advantages of rice-irrigation and to enable a large variety of wheats to be tested with a view to rust-resistance. There is still a great deal to be done in levelling the land on this farm and getting it into order before the results of experiments can be very instructive.

Experiments in rice consisted of comparing the results of transplantation with those of the local *machowa* method of sowing germinated seed broadcast in puddled land, of testing the effect of green-soiling, and of a series of manures. For wheat-cultivation an extension of the farm, so as to include an adjacent area of suitable land, is needed. Out of about forty varieties of wheat, seven or eight gave good promise of rust-resistance, and they will now be propagated on a larger scale. Late varieties of ground-nut, with two applications of water and with ashes as manure, gave very good results; but the small Japanese early variety is perhaps the most profitable to grow, owing to the ease with which the nuts can be harvested. A large number of other crops were grown, one of the most successful being the Egyptian *berseem*. The farm is also particularly suited to the growth of garden-crops owing to favourable conditions of soil and the proximity of Jubbulpore town, which provides an abundant supply of manure and a ready market for produce. A beginning of cane-cultivation was made under irrigation from the tank.

The outside demand for seed far exceeded the capacity of this newly established farm, and supply was limited to persons well known to the Department. The receipts of the farm were consequently small, while expenditure in the first year's working was naturally heavy, as it included not only capital outlay on buildings and equipment, but also expenditure on crops like sugar-cane the produce of which has not yet been brought to account.

The Akola Farm.

15. In common with the rest of Berar, the Akola Farm suffered from the late arrival and early withdrawal of the monsoon. Juar and the long-stapled *buri* cotton suffered severely from shortage of moisture, but the short-stapled cottons did fairly well, though not so well as in the previous year. Irrigation of cotton in a dry year has been proved to give increased outturns, but if the supply is from wells, the value of the increase is less than the cost of applying the water, and it appears to be established that in a normal year there is no profit in irrigating cotton grown on the common black soil of Berar.

The experiments conducted were mainly in repetition or continuation of those previously tried. A light dressing of nitrate of soda or saltpetre, following a fairly heavy application of cattle-dung, was found to be profitable for cotton. Topping of cotton-plants was again proved to be harmful. An interesting and apparently effective experiment of sowing lines of juar as a wind-break checked the intensity of red leaf-blight in *buri* cotton, which is perhaps caused by the hot dry winds which sometimes follow the cessation of the monsoon.

The main crop grown on the farm is the selected *rosea* variety of cotton, and the results of the year still further proved, if further proof is necessary, the superiority of this variety from a profit-making point of view. The farm serves as a centre for distributing pure seed of this variety, and the measures taken in this direction are elsewhere described.

Once more the working of the farm showed a considerable profit, and that in spite of a somewhat unfavourable season. Receipts amounting to Rs. 17,552 left a profit of Rs. 4,989, after paying all expenses, including the pay of the staff. Mr. Clouston and Mr. Bhaya Lal Dube are deserving of hearty congratulations on the continued success of their efforts. The reputation of this farm was further evidenced during the year by a well-attended and thoroughly successful meeting of the Berar Agricultural Association, at which about 2,000 landholders of the cotton districts were present, and which was attended by the Hon'ble the Chief Commissioner. About 1,800 cultivators came during the year on visits of inspection or business.

The thanks of the Department are due to Major Plowden, Deputy Commissioner, for the interest that he has taken in the Akola Farm, and for the assistance that he has rendered to our staff.

The Tharsa Farm.

16. The object of the Tharsa Farm is the study of certain problems in connection with demonstration work on areas commanded by the Ramtek tank. The farm has been only two years in existence, and a good deal still remains to be done in the way of levelling and cleaning the land and standardizing areas for experimental purposes. Nevertheless a very encouraging year's work has been done. An extraordinarily high outturn was obtained by sowing juar under irrigation in the hot weather, thus establishing a strong growth before the arrival of the rains. The universal practice of the cultivators is to sow this crop after the rains have broken, when its early growth is often hampered by water-logging in the heavy rains that follow. The produce obtained by the experiment was worth Rs. 69 per acre, as against a normal valuation of Rs. 30 for the yield under the ordinary methods. A fine crop of sugar-cane was obtained and a good deal of seed-cane was distributed to cultivators in the neighbourhood. Experiments in planting cane over several months indicate, though the results of one year require confirmation, that the season chosen by local cultivators, namely, the end of the cold weather, is too late, and that better results can be obtained by sowing even as early as October. Wheat was successfully grown after ground-nuts, but in order to avoid undue lateness in sowing the second crop, it is necessary to sow the ground-nuts early in June under irrigation. Other crops experimented with were rice, *berseem* and soy-bean. So far as our experiments have gone, soy-bean appears to be hardly worth cultivating in these Provinces: though a heavy crop can be obtained, its quality is poor and its oil-percentage low. The farm has a fine and healthy plantation of young fruit-trees.

The Telinkheri Farm.

17. The area of the small Telinkheri Farm was increased during the year by 72 acres, with a view to the production of fodder-crops for the adjoining dairy-farm. Apart from this object, the main purpose of the farm is to enable varieties of cotton, cane and rice to be studied under the close and constant supervision of the Deputy Director. Experiments in testing the lint-percentage of *rosea* cotton showed curious and interesting variations between different offspring of the same plant, some of

which were superior, and others inferior, to the parent, but collectively the offspring appear to maintain the percentage of lint given by the mother-plant. The experiment will be continued with a view to establishing the strains with the highest lint-percentage.

Egyptian clover (*berseem*) again gave a very fine crop, four cuttings being obtained, the last of which was as late as the middle of April. As it can be sown in a standing rice-crop before harvesting, there is no initial expense of cultivation. The great drawback in introducing this excellent fodder crop, which lasts well into the hot weather, is that, though its growth is luxuriant, its seed-production has so far proved to be very poor, and it is thus necessary to import seed every year.

The Sindewahi Farm.

18. Good progress has been made in getting into order the newly established agricultural station at Sindewahi in the Chanda District, the main purpose of which is the growth of sugar-cane and its extension in the areas commanded by the lately constructed Government tanks in the neighbourhood. Part of the area consists of a light porous and sandy loam, which is excellent for the growth of cane. Sufficient cane was grown to distribute a fair quantity of seed to cultivators, but the demand was far in excess of the supply—a most encouraging sign in a somewhat backward but promising tract. The most formidable enemy of cane in this neighbourhood is the wild pig, but he is being successfully thwarted by a cheap but most effective type of wire-fencing lately introduced by the Department, and already being adopted by some of the more enterprising cultivators.

There appears to be good promise of success in growing the longer-stapled varieties of cotton under irrigation in this tract, and the experiments of the year gave most encouraging results.

No progress has yet been made in establishing the proposed model village at Sindewahi, as there are still some problems, in connection with the existing rights of the villagers, which await further local investigation.

The Raipur Farm.

19. Under a change of management, the results obtained at the Labandih Farm in Raipur were considerably better than in the previous year. No new lines of experiment were undertaken, and the whole of the non-experimental area under rice was devoted to the transplanted crop, which again proved its great superiority, from every point of view, to the crop sown broadcast after the usual local method. The method of transplanting rice by single seedlings, instead of in bunches as practised by cultivators in the districts where rice is transplanted, has now proved itself not only the most economical method as regards the expenditure of seed, but also the most productive in the matter of outturn. The single-seedling method is now universally followed in Chhattisgarh, wherever transplantation has been introduced.

Experiments in irrigation, to test the quantity of water required to save a transplanted as compared with a broadcast rice-crop, were vitiated by the late arrival of the rains, which necessitated the application of water for puddling the soil for transplanting. Some very fine outturns of wheat, both manured and unmanured, were obtained under a single irrigation, the variety which gave the best results being one known as Pusa No. 7. Both wheat and rice gave increased outturns under the chemical manures, calcium nitrate and calcium cyanamide, but the cost of the manure at present prices outweighs the value of the increased yield obtained. Fine results were obtained from green-soiling rice plots with *san* hemp.

As in the Berar, Nerbudda and Jubbulpore Divisions, a meeting of Agricultural Associations was held at the farm, and was attended by over a thousand persons. The evidence of an awakening interest in agriculture among the stagnant cultivators of Chhattisgarh is one of the most hopeful features of the Department's work.

(b) *Economic Botanist.*

20. It has been found that if the services of the Economic Botanist are to be utilized to the best advantage, it is necessary to leave him as free as possible for touring, and his lecturing work at the Agricultural College has consequently been almost discontinued. He is still most seriously handicapped by want of a laboratory and other accommodation for the proper care and arrangement of specimens under examination, but rapid progress is now being made with the construction of the new laboratories.

Mr. Graham's report gives in very brief detail the summary of a very considerable volume of work. Special attention was given to rice, juar, wheat and varieties of capsicum. The selected varieties are sent to the different farms for test. A thorough survey and classification of the various rices of the Province was continued during the year: the task is an enormous one but is nearing completion, and a preliminary note has been issued. A specially select variety of chilly has created great public interest, and two out of three selected varieties of melons have also won their way to popular favour.

(c) *Agricultural Chemist.*

21. In spite of deficient laboratory accommodation, the Agricultural Chemist deals with a steadily increasing amount of analytical and research work, and the number of analyses performed by him or his staff rose from 88 to 153. A new feature of the year's work was a series of demonstrations on soils and the principles of soil-classification to the Settlement staff of Nagpur district. An interesting instance of the manner in which the more scientific side of departmental work can be brought into close touch with practical needs was the examination of a large variety of soils, sand and clay available for use in constructing the embankment of the Mahanadi Irrigation headworks, with a view to testing their relative water-retaining power and permeability. Examination of various unsuccessful wheat-soils on the Tharsa Farm proved that their want of success was due to water-logging rather than to any constituent defect. Sugar-cane analysis was continued, and fortnightly tests of juice were made in connection with the Tharsa experiments directed to investigating the period over which it is possible to extend the harvesting of the cane.

In addition to the performance of research and analytical work, the Agricultural Chemist and his staff also lecture to the classes in the Agricultural College.

(d) *Entomology.*

22. There is no Entomologist among the superior staff. Apart from work done in investigating the possibility of cultivating the *eri* silk-worm, the conclusions of which are mentioned below, the Assistant engaged in entomology continued his work of studying the sugar-cane borer, and other miscellaneous work, including the collection of specimens for the Entomologist at Pusa. It is found that large numbers of the cane-borer infest the stubble of cold-weather juar, and the only remedy is to advise the cultivator to uproot and destroy these,—a somewhat heavy and altruistic operation if he is himself not a grower of cane. On the Government farms at Tharsa and Sindewahi maize is grown round the cane-crops as a trap for the borer.

(e) *Sericulture.*

23. During part of the year attempts to rear the *eri* worm were continued at Sindewahi, but were again most discouraging. Even at those times of the year when it can be bred it is liable to disease, and it is quite clear that the worms, which thrive best in a warm moist atmosphere, cannot survive the excessive dryness and heat of our hot weather. During this period we are thus faced with two alternatives, either to cease rearing altogether or to rear only sufficient stock for reproductive purposes. The former alternative necessitates obtaining

a fresh supply of seed from elsewhere every year, a matter which we have hitherto found very difficult and expensive: the latter alternative requires artificial means of producing the necessary conditions of warm moisture in order to tide the small reproducing stock over the hot dry months. In either case the extra expenditure involved renders it impossible to run the industry at a profit, and places it quite beyond the scope of village enterprise. The experiment has now been abandoned.

(f) *Cattle-breeding and Dairy-farming.*

The Powarkhera Farm.

24. The Powarkhera herd of 65 cattle consists of pure Malvi animals, and bulls are bred for stud purposes. The demand for bulls is now greater than the farm is able to supply, and the price of Rs. 100—a good price in the Nerbudda valley—was obtained for each bull sold. The young male stock has increased, and the herd has been improved by the elimination of cows that were old or not true to type. Excluding money spent on buildings and fencing for the newly acquired area, receipts almost balanced expenditure. There were four casualties among the young stock, but there were no deaths from epidemic disease, though rinderpest was present in the neighbourhood, timely precautions being taken by effecting inoculation of the whole herd.

The Telinkheri Farm.

25. At Telinkheri, besides the recently started dairy farm, the Department has a cattle-breeding farm, which has now been for some years in existence, with the object of breeding bulls of the well-known Gaolao type. Judged simply by the statement of receipts and expenditure, the year was a successful one, with a net profit of Rs. 1,300. Good prices are now obtained for our young bulls, and the average price of Rs. 159 realized during the year was the highest on record. The year was, however, rather a disastrous one. In the hot weather the fodder supply ran short and had to be supplemented from outside. While the cattle were in reduced condition owing to low feeding, rinderpest broke out and was followed by a severe visitation of liver-fluke and tick-fever, which caused a number of deaths among the animals, though fortunately the good breeding-stock escaped better than the inferior animals and recently captured wild cattle. The liver-fluke was directly traced to the presence of numbers of small snails prevalent on the edges of the tank, at which the cattle have always been watered, and which recedes very rapidly in the hot weather. The tick-fever was caused by the presence of a severe plague of ticks, which found abundant harbourage in the mud and timber feeding-troughs. Prompt measures were taken to prevent any recurrence of similar disasters. A well has been sunk for watering the cattle, the worst types of feeding-troughs were removed and replaced by those of more suitable construction, while tarring, spraying and firing were employed to get rid of the ticks. The farm is now believed to be free of the pest, but the sheds require considerable reconstruction to prevent any similar outbreak in future, and the work of reconstruction is now in progress.

Cattle-feeding in Chhattisgarh.

26. For the last three years the Nawagaon reserve in the Raipur district has been the scene of an interesting experiment, which has shown how greatly even the miserable stunted cattle of Chhattisgarh can be improved by simply feeding them on common spear grass, cut in good time before formation of the spears, and supplemented by silage of the same grass in the hot weather. But this experiment dealt only with ordinary specimens of the wretched Chhattisgarhi animal, and if a permanently better type is to be obtained, the scheme must include not only proper feeding, but also breeding from carefully selected parents. To this end a breeding farm for Chhattisgarhi cattle has now been opened at Chandkhuri, nine miles from the Raipur Farm, and has been stocked with 40 good cows and a bull obtained from the zamindaris, where, owing to the presence of large areas under forest, the cattle are better than those of the bare and open plains. Most of the area of the farm is commanded by the Kurud tank, and fodder-crops can thus be grown under irrigation. The main object of the farm will be to rear good cows and bulls for the owners of private breeding farms. In many parts of the Province there are now signs of an awakening interest in cattle-breeding. In Jubbulpore Mr. Shamsundar Bhargava has made a promising start, and even in backward

Chhattisgarh eight privately owned breeding farms were opened during the year, while four such farms previously existing are making satisfactory progress, the best being that at Indagaon in Bindra-Nawagarh zamindari. The Nawagaon reserve has been handed over on favourable terms to a co-operative society of persons residing at Raipur, which has been formed with the object of cattle-breeding, and the stock required for starting the enterprise has been bought by the Deputy Director on behalf of the members. It is too early yet to say whether this society is likely to be successful: at present its members appear to be relying overmuch on the Agricultural Department, and to be somewhat lacking in practical and personal interest in the scheme. The Department cannot undertake the work of detailed supervision of private farms, and close personal attention is necessary on the part of owners.

The Telinkheri Dairy Farm.

27. The Government Dairy herd at Telinkheri, which was started last year, has now a strength of 64 animals. As in the case of the herd on the adjoining breeding farm, rinderpest broke out in the hot weather, but the cattle were twice inoculated during the year, and only one animal died of the disease. The milk-yield has so far proved to be very low, but scientific feeding and careful improvement of the stock, most of which has only lately been obtained, will doubtless soon effect an improvement in this respect. One object of the farm is to improve the Nagpur milk-supply, but the milch-cattle belonging to Government are too few to meet the demand, and an arrangement has therefore been effected by which a co-operative society of Gaolis has come under the control of the Dairy Farm under certain conditions, which provide for compulsory veterinary examination of the cattle, adherence to the Government grazing area, feeding and milking under the supervision of the farm staff, and housing in the Government sheds. Grazing and fodder are provided at favourable rates, and concentrated foods are supplied at cost price, which is favourable to the Gaolis, as these are obtained at wholesale rates. The services of the Government bulls are provided free of charge. The milk is all handed over at the fixed rate of nine seers per rupee to the Dairy Farm, which in turn hands it over to contractors, Messrs. Byramji & Co., at the same rate. The contractors have opened a well-built and well-kept dairy-house at Telinkheri, where they carry on the work of distributing the milk to customers and other dairy operations. Milk is sold to the public at six seers per rupee. These arrangements have been greatly appreciated by the public, who have now, for the first time, a wholly trustworthy milk-supply at reasonable rates.

The Gaolis have, however, given a great deal of trouble, and it requires constant supervision to keep them strictly to the terms of the agreement. It is quite possible that the scheme, though saving them a great deal of trouble, is less profitable to them than private trade under no restrictions, and they stoutly maintain that they are losers over the innovation. Their complaints are now under investigation from the financial point of view. Until this scheme has been working for a full year, it will not be possible to say whether they can be paid at higher rates for their milk without enhancing the cost of retail supply to the public, but so far as the enquiry has gone, there seems reason to believe that arrangements can be made which will be thoroughly satisfactory to all parties. Meanwhile, as it is too early to ask the contractors to make any concessions, while it is of the very greatest importance to ensure the continuance of this hitherto promising and successful scheme, the Gaolis have been granted small additional concessions in the matter of grazing their animals at Government expense.

PART IV.—DEMONSTRATION, &c.

Nerbudda Division.

28. In the Nerbudda Division, demonstration work proceeded on lines already successfully adopted, and no great departure of importance was made. Effort is concentrated on creating a supply of pure and selected seed, especially wheat, til, and to a minor degree cotton, and the system adopted is to enlist non-official help in the shape of seed-farms privately owned and cultivated, but closely supervised by officers of the Department. The seed provided is made over or offered to the Department, which arranges for its distribution to the numerous applicants who

are now desirous of obtaining it. There are now six of these private seed-farms for cotton in Nimar, where most useful work in this direction has been done by Rao Sahib Dajiba Patel and Thakur Kishor Singh, and more are now being opened in the adjacent tracts of Hoshangabad. The seed sown was wholly the well-known *rosea* of Berar, but the rainfall was extraordinarily short, and the earlier ripening Saugor *jari* is perhaps more likely to be worth adoption in the Nerbudda valley. Every district of the Division had one or more wheat seed-farms, some of which were very successful, while others were damaged by hail and rust. In spite of the fact that the last two years have been very unfavourable to til (*sesamum*), good progress continues to be made in the devotion of compact areas to the valuable *purvi* variety, which gives a high outturn and has a ready market at enhanced prices. In the Seoni-Malwa tahsil Mr. Evans' efforts to introduce this variety have been so successful that the complete exclusion of the inferior country variety seems to be within the bounds of possibility—a consummation devoutly to be wished, as the *purvi* variety is particularly liable to deterioration through cross-fertilizing from inferior types. Among non-official gentlemen who have given valuable help in the Nerbudda Division are Kaluram Patel of Hirankhera, Seth Hari Shanker and his agent Thakur Manohar Lal in Hoshangabad, and Pandit Appaji of Chaurai in Chhindwara.

Jubbulpore Division.

29. In the Jubbulpore Division, cultivation on irrigated areas served by tanks will be studied mainly on the new Government farm at Adhartal, but demonstration of this subject has been continued at Mahgawan in the Jubbulpore district, and has been begun at Jarwahi in the same district and at Rumal in Seoni. Results at Mahgawan, under an excellent kamdar, were very satisfactory in spite of an unfavourable season and the usual damage by pig. The superiority of transplanting rice over the local *machowa* method was thoroughly proved, but the introduction of transplantation is hampered by dearth of labour. Experiments in sugar-cane were continued, and a brisk demand for iron cane-mills has arisen in the locality. Cane cultivation on private land failed at Rumal owing to the apathy and hostility of the people, under a curious belief, it is said, that the Government intends to acquire the command-area for the establishment of a central sugar factory.

The work in these irrigated areas, though very important, is, however, a mere fraction of the now very extensive demonstration work of the Division; and a feature on which the Deputy Director, Mr. Evans, is to be congratulated is the marked degree to which non-official interest has been secured. Prominent among our non-official helpers are Pandit Kesho Rao Phansy in the Sihora tahsil, Thakur Arjun Singh Faujdar in Jubbulpore, Pandit Har Dyal in Mandla, and in Seoni Pandit Jiwan Lal and Dadu Vishwanath Singh. Detailed information cannot be given in this summary, but it may be mentioned that 42 private seed-farms existed during the year, under the supervision of the Department. It is impossible for the Government farms to supply the increasing demand for pure selected seed, and reliance is therefore placed on good agriculturists for the supply. Most useful assistance in this direction is obtained from the Seoni Court of Wards in charge of the Diwan's Estate. The private farms obtain their seed from a Government farm in the first instance and sow it on approved land, agreeing to carry out certain simple rules as regards the growth, harvesting and storage of the crop, in order to maintain its purity, and also agreeing that the surplus shall not be sold till it is approved by the Department. Failure to maintain purity entails loss of the Government guarantee of quality.

Another matter of which mention may be made is the demonstration of cotton and juar-sowing in lines, with inter-cultivation, in the Patan tahsil. Results were obtained much superior to those of the local broadcast methods with hand-weeding, but not much success has yet been obtained in inducing people to follow the example set them. The defect probably lies in the fact that the areas selected for demonstration have been much too small—often less than an acre—to prove the profit of the superior method, and in future the areas chosen for the purpose will be less numerous but larger.

The Sihora Pure Seed Supply Association, run as a co-operative society, has been reorganized. It was found that the business of marketing the produce in bulk was somewhat beyond the capacity of the Association, and efforts are now confined to organizing and controlling cultivation. For this purpose Agricultural Unions, each composed of several rural co-operative credit societies, have been formed, and each society appoints one of its members as kamdar, whose main duty is to ensure the purity of the seed by seeing that members conform to certain simple rules. The kamdar also keeps the Department informed, through the President of the Union, of seed requirements and stock likely to be available for sale. In connection with the expansion of pure wheat cultivation in the Sihora tahsil, Rai Bahadur Bisen Dutt Shukul and Rai Sahib Gurudin Misra were again hearty and energetic helpers of the Department.

Fairs and Agricultural Shows, Northern Circle.

30. Agricultural Shows were held, generally at fairs, in every district of the Northern Circle except Chhindwara. Opportunity is taken on such occasions not only to give prizes for the best exhibits, but also to demonstrate improved varieties of seed and implements. The thanks of the Department are due to Pandit Govind Rao of Linga in the Narsinghpur district for his successful management of the Barmhan fair. In Jubbulpore the scene of the District Agricultural Show was changed, with great success, from Bheraghat to the Government Farm at Adhartal, and the occasion was used to hold the first general agricultural meeting for the whole of the Jubbulpore Division. The meeting was attended by the Hon'ble the Chief Commissioner, who presented sanads and medals to certain gentlemen in recognition of their efforts in the cause of Agriculture. For the two Northern districts, Saugor and Damoh, where lack of staff has prevented the Department from extending its operations on any considerable scale, it is now proposed to hold a joint agricultural show at the Garhakota Fair. These fairs receive grants from the Department and District Councils, but the bulk of the expenditure is met from private subscriptions. The Nerbudda Divisional Show was held at the Powarkhera Farm; it was attended by a large gathering, and resulted in a keen demand for the implements and machinery exhibited. Sanads and medals were also presented at this gathering.

Help from District Officers, Northern Circle.

31. Mr. Evans gratefully acknowledges the help which he has received from District Officers, and in particular I would mention Rai Bahadur Anant Lal, Mr. Mian Bhai Abdul Husain and Khan Sahib Wali Muhammad, Extra-Assistant Commissioners; Messrs. Gokul Prasad, Mihr Ali and Adhuram Chaudhari, Tahsildars; Thakur Chhattra Singh, Manager, Court of Wards, Seoni; and Mr. Purshottam Das, Deputy Inspector of Schools, in Mandla.

District Agricultural Associations.

32. The District Agricultural Associations have always been useful in the Northern Circle, but there are indications that, having served their purpose by bringing the Department into touch with the best local agriculturists, they require to be split up into smaller and more business-like bodies, if effort is to be concentrated and good practical results are to be obtained. Considerable progress has already been made in this direction. In Hoshangabad, besides the comparatively long-established sub-association at Seoni-Malwa, there is also one in the Sohagpur tahsil, having its head-quarters at Pipariya and working in close touch with the Co-operative Central Bank. This association is giving valuable help in the establishment of private seed-farms for wheat and til, while the Seoni-Malwa committee, in addition to continuing its well-known efforts towards the improvement of til and the destruction of pig, will now have under its control a number of well-organized wheat and cotton seed-farms. Sub-associations have also been formed in Chhindwara, Jubbulpore and Mandla, and are now being formed in Seoni and Saugor. At Betul, where there are several keen and public-spirited gentlemen, the District Association has been transformed into an Agricultural Union for the demonstration of improved varieties of crops and of implements, and for the propagation and distribution of pure seed. For this purpose, the members have subscribed Rs. 6,000 and have leased a piece of land near Betul. The scheme is closely bound up with the co-operative movement, loans for the purchase of implements being supplied by the Central Bank, which keeps a stock of implements at its office, while the seed propagated by the members of the Union will be distributed among the co-operative societies.

In the Southern Circle the most useful and practical of the District Agricultural Associations are those of Berar, where all members now pay an annual subscription, the proceeds being partly utilized in the grant of prizes for the best exhibits of produce at the annual Divisional meeting. The associations are co-operating heartily with the Department in opening cotton seed-farms and in the sale of implements. The meeting of the Berar Agricultural Associations at the Akola Farm has already been mentioned. This meeting resolved itself into committees to consider the best means of extending the distribution of pure cotton-seed, the introduction of improved implements and machinery, and to award prizes for the best samples of cotton, juar and ground-nut sent to the meeting. Their suggestions have been adopted and put into practice.

Employment of kamdars.

33. The reports submitted by the Deputy Directors contain repeated references to the success which has attended the experiment of entrusting practical work on demonstration areas to trained kamdars. These men are trained on the farms, and serve the purpose of practical work on small areas at least as well as the more expensive College-trained student. They are men of agricultural castes, and will be employed as far as possible in their own part of the country. The Local Administration has now sanctioned a large increase in the staff of these men, and we shall in time have a staff of 42 permanent men on rates of pay ranging from Rs. 16 to Rs. 50. The permanent men will henceforward be known as jamadars, while the term kamdars will be reserved for a varying number of additional men who will be necessary, and whose temporary employment will be sanctioned from time to time.

Demonstration work in Chhattisgarh.

34. In Chhattisgarh the main lines of demonstration work are the transplantation of rice, the cultivation of ground-nut and sugar-cane, and the manuring of rice. The first of these subjects is of primary importance, not only because of the immense prospect of profit which it opens to the cultivator, but also as a means of realizing fully the benefit of the irrigation which will be available on completion of the Tendula and Mahanadi canals. Progress during the year was most encouraging, and the co-operation of the Land Records staff in the work of pushing transplantation has been of the greatest assistance. Rice was transplanted under the supervision of the Department in no less than 2,163 villages, and the area under the transplanted crop rose from 6,900 to 16,000 acres. Officers of the district staff carried out a number of experimental rice harvestings, the results of which showed even more conclusively than those of our own experiments the advantages accruing from transplanting the crop. Khan Sahib Israel Talabuddin, by example and successful enterprise, has done much to assist the Department in the improvement of rice cultivation in Chhattisgarh. Further to encourage the movement a party of 22 cultivators was taken by the Divisional Superintendent on a visit to Balaghat, where they were able to meet some of the local malguzars and discuss with them the outstanding features of rice-cultivation in that district. Cultivators in Chhattisgarh have been rather diffident in taking water from Government tanks, but the rebate of four annas per acre on the water-rate charged for transplanted areas should encourage transplantation.

Other directions in which progress, though very much slower, is visible are the irrigation of wheat, and the cultivation of ground-nut and sugar-cane. A few acres of cane are cultivated under seven of the Government irrigation tanks, but the more certain supply of water available from the canals must be awaited before any great advance in the cultivation of cane can be expected.

Mr. Clouston commends to favourable notice the work of Rai Sahib Tundilal Powar, Superintendent of Agriculture in this Division. Among officers who have given great assistance to the Department are Mr. Crawford, Deputy Commissioner of Drug, and Messrs. Muhammad Hamid and Krishna Sewak, Tahsildars.

Demonstration Work, Nagpur Division.

35. In the Nagpur Division there has been slow but steady progress. Pure *rosea* cotton was grown on 19 private seed-farms in Wardha and on 16 in Nagpur. It is hoped that the successful experiment of irrigating *buri* cotton on light soil, already mentioned in dealing with the Sindewahi Farm, will find imitators in the surrounding country, and a supply of seed for distribution has been laid into stock. Under the Ramtek tank

the cultivation of cane is advancing, and the area under this crop rose from 70 to 255 acres during the year, while smaller areas were grown under the Government tanks of Bhandara and Chanda. It is to be feared that a failure of the Ghorajheri channels, which occurred in May, has somewhat shaken confidence in one of our most promising cane tracts. Every effort is made to show cultivators the best methods of growing and manuring cane and the most economical means of dealing with it, when cut, by the use of improved cane-mills and the Poona furnace. Mr. McGlashan, who has secured an option for a cane factory in the area commanded by the Ghorajheri tank, is now clearing the land required for cultivation. The cultivation of the valuable late-yielding variety of rice known as *gurmatia* was pushed under the Ramtek tank and 7,650 lbs. of seed were distributed.

Distribution of pure cotton seed in Berar.

36. The private cotton seed-farms in Berar rose in number during the year from 40 to 90, and produced 331,000 lbs. of *rosea* seed. These are supplied as far as possible with seed from the Akola Farm, but the practical limitation of our powers in this direction, combined with the impossibility of affording departmental supervision everywhere, has necessitated, as was foreshadowed in last year's report, the introduction of an intermediate agency between the Government Farm and the private seed grower. Mr. Standen, Commissioner of Berar, has interested himself keenly in the subject, which was one of those discussed by a committee of agriculturists at the Divisional meeting. As a result a beginning was made with half a dozen Agricultural Unions, which have been registered as co-operative societies, and since then some 25 additional Unions have been formed, but have not yet been registered under the Co-operative Credit Societies Act. The Unions will each control about 500 acres under improved cotton-seed, and each will employ and pay for a kamdar trained by the Agricultural Department, which supplies its available seed to the Unions in preference to other purchasers. It is hoped that with the aid of these Unions the whole of Berar will soon be sown with the types of cotton recommended by the Department. The demand for seed is exceedingly keen, the prices paid being double and treble the bazar rates for ordinary seed, and the high lint-percentage obtained from *rosea* cotton will add enormously to the wealth of Berar if pure seed of this variety is universally sown.

PART V.—AGRICULTURAL ENGINEERING.

37. In the Northern Circle, although the Adhartal Farm has now become the centre for many of the districts which formerly looked to the Powarkhera Farm as their source of implement supply, the latter farm supplied 184 implements during the year. The Adhartal Farm supplied 155, and the total number of implements sold in the Circle was thus 339 as against 154 in the previous year. In the Nerbudda Division iron winnowers are in greatest demand, while in Jubbulpore the cheap but effective "Meston" and "Monsoon" ploughs found a ready sale, though this was the first year of their introduction. In one tract of Jubbulpore 26 iron cane-mills were sold, and it is reported that in this tract iron cane-mills have now completely ousted the old-fashioned and wasteful mills formerly in use. The winnower and seed-drill designed by Mr. Cove, Head Master of the Government School of Handicrafts, are still in the experimental stage. The "Nerbudda Reaper," specially designed for the Central Provinces, appears to have met with a favourable reception. It was exhibited at work on the Powarkhera Farm, with the result that orders were placed for 30 machines, a demand with which it was impossible to comply without considerable delay, as the machine is imported from Glasgow. This machine will cut about 200 acres of wheat a month, and if used over an area of this extent, almost saves its cost—Rs. 200—in the first year's working. The servants of intending purchasers are specially trained in the use of this machine and it is not recommended to any one who has not taken pains thus to provide for its efficient working.

Southern Circle.

38. In the Southern Circle there was a slight increase in sales of implements or their parts, and in all there were 575 sales, including 2,860 yards of pig-proof fencing. The most popular implement sold was the turnwrest plough, of which Berar alone bought 137. Five oil-engines were sold. Berar, with its greater wealth, appears to be more enterprising in the adoption of modern implements than the rest of the Southern Circle, but there was a fairly good demand for iron cane-mills in the Nagpur and Chhattisgarh Divisions, which took 16 and 13 of these machines respectively.

The sale of iron ploughs in Berar was much facilitated by the appointment of honorary agents, who, in accordance with the practice favoured by a committee appointed to consider the subject at the Akola Agricultural meeting, obtain their supplies direct from the manufacturers.

Employment of Trained Mechanics.

39. The introduction of machinery on the farms and among private owners has rendered it advisable to take measures to ensure proper care and supervision of the machines obtained. Trained mistris have therefore been appointed to the farms, or will be appointed when the men sent to Calcutta for training have returned. Their services are available to private owners.

PART VI.—PUBLICATION AND DISSEMINATION OF AGRICULTURAL INFORMATION.

40. The *Agricultural and Co-operative Gazette* increased its circulation by 249 copies, most of the new subscribers being Co-operative Credit Societies. The circulation now amounts to 6,249 copies, of which 2,451 are in Marathi and 3,466 in Hindi, the small remainder being in English.

Cotton Returns.

41. An attempt is being made to improve the intelligence available to cotton-merchants by publishing a weekly return of the amount of cotton arriving at all the principal cotton markets of the Province and of the number of bales pressed at all presses, together with figures of the two preceding years. The figures are at once compiled and printed up, and a statement is distributed gratis to interested persons and cotton concerns, besides being published in the *Central Provinces Gazette.* Cotton market committees and press-owners have co-operated readily in supplying the required information, and the returns appear to be serving a useful purpose. The advice of Sir Bezonji Dadabhoy, Manager of the Empress Mills, Nagpur, was of much assistance in drawing up the scheme.

PART VII.—MISCELLANEOUS.

The Nagpur Museum.

42. During the last two years the Nagpur Museum has received very careful and systematic attention, and has aroused largely increased popular interest. The average daily number of visitors is now 415, representing an increase of nearly 150 per day within the last two years. This remarkable increase is attributed to the great improvement in the Natural History Section, where the exhibits are well set up and preserved and carefully labelled and described. An instructive feature is a case displaying birds beneficial and injurious to agriculture, together with specimens of the food eaten by each variety. Lack of accommodation prevents exhibition of the larger mammals.

In the Archæological Section the only additions were two inscribed stones from Damoh. A descriptive catalogue of the archæological exhibits, with an introductory instructional note, is now in the press. For six months Rai Bahadur Hiralal was on deputation, assisted by Munshi Abdus Saboor, to prepare a list of inscriptions in the Central Provinces: this list is now being printed.

Messrs. Graham and D'Abreu have reason to be well pleased with the success which they have achieved at the Museum, and with the greatly increased popular interest which their efforts have aroused.

The Raipur Museum.

43. The Raipur Museum fully maintained its popularity. The chief addition to its exhibits during the year was a set of clay models from Poona. At present the Committee has a considerable balance of funds, with no definite scheme of utilizing the money. The weaving school attached to the Museum, though carefully fostered by the Committee, shows little sign of vitality. We are expecting a textile expert shortly, and when he arrives, the Department will be able to offer its advice and assistance.

J. HULLAH,

Director of Agriculture and Industries,

Central Provinces.

Govt. Press, Nagpur:—No. 1163, Dr. of Agri.—14-10-13—600.

REPORT

ON THE WORKING OF THE

DEPARTMENT OF AGRICULTURE

CENTRAL PROVINCES

FOR THE YEAR

1913-14

Agents for the Sale of Books published by the Central Provinces Administration.

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No. 531 / XIII-18-19.

Central Provinces Administration

AGRICULTURE DEPARTMENT

Nagpur, the 25th November 1914.

READ—

Report on the working of the Department of Agriculture, Central Provinces, for the year 1913-14.

RESOLUTION.

As was foreshadowed in last year's Resolution it has been necessary to call a halt in the expansion of the activities of the Department until the supervising staff shall have been brought to full strength. This decision, coupled with an unfavourable season and several unavoidable changes in the office of Director, has naturally led to an apparent contraction of enterprise in what has hitherto been one of the most progressive departments in the Provinces. But if the rate of progress has been less rapid, the results of a year's steady effort along lines already opened up have been none the less solid and important. Of the two new posts sanctioned on the superior expert staff, one was filled at the close of last year while the candidate for the other has just been recruited. The creation of a third and independent charge for the Berar cotton country may soon be expected; this will afford much needed relief to the hard pressed Deputy Director in charge of the Southern Circle, and make it possible to bestow greater attention to the development of the comparatively backward Chhattisgarh country.

2. The results obtained on the various research and experimental farms were affected by the unfavourable nature of the season, but the Akola farm was able to show a profit, thanks to the high price it commanded for its Rosea cotton seed. In Raipur the rice crop was a poor one, and owing to drought in September the single seedling method of transplantation was not so successful as that of transplantation by bunches. At Tharsa also the rice crop was a failure, and at the Adhartal farm in Jubbulpore the wheat crop suffered severely, first from the heat consequent on the early cessation of the monsoon, and later, at the close of the season, from untoward rain and hailstorms. Nevertheless much interesting and useful progress has been made. The success of cane and irrigated cotton experiments at Sindewahi is most encouraging as is also the kharif cultivation at Powarkhera, and the experiment at Tharsa in irrigated wheat, sown after ground-nut, holds out great promise for this form of agriculture.

3. Good progress was made in demonstrating improved methods of agriculture, although the character of the season was anything but propitious. In Chhattisgarh the area under transplanted rice rose from 16,000 to 30,194 acres, but in a few places owing to the excessive enthusiasm of the demonstration staff the seedlings were transplanted to areas where they were insufficiently protected and fared badly in consequence. The high profits obtainable by the new system when intelligently applied in suitable areas, estimated at Rs. 15 per acre, should be sufficiently attractive to encourage an extension of the practice.

4. The work of distribution of pure cotton seed in Berar through private seed farms on co-operative lines has proceeded apace. Last year there were 90 such farms, which supplied 331,000 lbs. of seed. This year there are 400 farms which supplied over 2 million lbs., sufficient to sow 200,000 acres. These cotton farms are grouped in Co-operative Unions, of which four only up to the present time have been registered as societies under the Co-operative Societies Act.

5. It is regrettable that cane cultivation should have received a setback, in Chhattisgarh owing to the lack of water in the Government irrigation tanks, the whole supply of which was required to save the rice crop, and in the Nagpur Division owing to an unfortunate misunderstanding. The Chief Commissioner trusts that every effort will be made to regain the lost ground. In Chanda it is satisfactory to note that the yield of the experimental plot cultivated by the concessionaire was beyond his expectations.

6. The question of the best system of agricultural education has yet to be solved. The difficulty of attracting the true agriculturist classes, and of providing a curriculum that can be easily assimilated at once by the would-be practical farmer, and yet be sufficiently scientific for the more advanced and intellectual student, is one that is felt in every Agricultural College in India. While inclined to agree with the Director that the time has come when it is necessary to differentiate between the lower subordinate service, for which the teaching should be confined to practical agriculture, and the upper, for which a more scientific training will be necessary, the Chief Commissioner fully sympathizes with Mr. Allan's disinclination to discard the curriculum so recently recast before its results can be tested, and is content to await the further report promised.

7. The Telinkheri Dairy, composed of a combination consisting of the Agriculture Department, a contractor, Mr. Byramji, and a society of Gaolis registered under the Co-operative Societies Act, continued to furnish a good supply of milk at very reasonable prices, and there can be no doubt that the scheme, which is believed to be the first of its kind in India, has done much to remove the reproach that previously existed regarding the milk supply of Nagpur. Unfortunately the Gaolis have not yet assimilated any real idea of co-operation and apparently find it hard to rid themselves of the bad habits into which they had fallen during the acute competition of unaided private enterprise. The Chief Commissioner is not without hope, however, that it may eventually be possible to teach them the sound policy of honest dealing. The Experimental Dairy attached to the Agricultural College, has, in spite of its modest size, shown that dairy products can be supplied at a profit and the results of the year's working are highly satisfactory.

8. Cattle breeding was more successful during the year at the Powarkhera than at the Telinkheri farm, where again there was a serious attack of tick fever resulting in considerable losses. The experiment of private cattle-farms continued, and two, at Nawagaon and Khandwa in the Raipur district, have now been registered as co-operative societies. These societies, together with the Government farm at Chandkhuri, should be of a high educative value, not only in matters of co-operation and cattle improvement, but also as centres for demonstrating the uses to which the unpromising areas of the fuel and fodder reserves of Chhattisgarh can successfully be put, and the Chief Commissioner will watch their progress with interest.

9. The Chief Commissioner desires to congratulate Mr. Low on the instructive and interesting report which he has written, showing as it does on every page the practical knowledge which he brings to bear on the multifarious activities of his department. His thanks also are due to the many gentlemen, official and non-official, whose names have been brought to notice in the report. More particularly would he join in the high praise which the Director bestows on Messrs. Clouston and Evans, the Deputy Directors Sir Benjamin Robertson has on several occasions seen for himself the wonderful confidence which they command amongst the cultivators of the Province and which has led to such highly successful results in many directions.

ORDER.—Ordered, that a copy of this Resolution, together with the enclosure, be submitted to the Government of India in the Revenue and Agriculture Department, that copies be forwarded to the Director of Agriculture and Industries and to all Commissioners and Deputy Commissioners, Central Provinces, for information and guidance; and that it be published in the Supplement to the *Central Provinces Gazette*.

C. G. LEFTWICH,

Third Secretary.

Govt. Press, Nagpur:—No. 1709, Civil Sectt.—26-11-14 600.

REPORT ON THE WORKING OF THE DEPARTMENT OF AGRICULTURE, CENTRAL PROVINCES, FOR THE YEAR 1913-1914.

PART I.—ADMINISTRATION.

Mr. Wills held charge of the office of Director of Agriculture and Industries during the year under report up to 29th July 1913, when he proceeded on leave, and was succeeded by Mr Hullah, who held charge till the 19th September 1913, when he was appointed Third Secretary to the Hon'ble the Chief Commissioner. Mr. Allan, Principal, Agricultural College, Nagpur, then assumed charge in addition to his own duties till I returned from leave on the 2nd October 1913. After five weeks, I left for Bengal on deputation and made over charge on the 8th November 1913 to Mr. Clouston, who held charge till relieved by Mr. R. C. H. M. King, I. C. S., on 5th December 1913. Mr. Clouston again assumed charge of the office on the 9th March 1914, when Mr. King proceeded on leave and continued to hold charge till relieved by me on the 15th May 1914, on my return from Bengal. These constant changes, in addition to the absence of various members of the expert staff on leave for prolonged periods, undoubtedly prejudiced the working of the Department to some extent. I am also for the third time under the disadvantage of writing the report for a year during which I have been in actual charge of the Department for a few weeks only.

2. Mr. Evans continued to hold charge of the Northern Circle till 1st May 1914, when he proceeded on six months' combined leave. He was relieved by Mr. Ritchie.

3. Mr. Clouston, Deputy Director of Agriculture, Southern Circle, was on combined leave from 11th April to 10th October 1913, during which period Mr. Allan held charge of the Circle, in addition to his own duties as Principal, Agricultural College, Nagpur.

4. Out of the two posts added to the superior expert staff of the Department, one only has been filled up. Mr. Ritchie took charge of the post of Assistant Director of Agriculture, Southern Circle, on the 17th October 1913. Mr. G. D. Mehta, who was attached to this Department and who was working under Mr. Clouston, was transferred to Madras on 2nd December 1913.

5. Mr. Allan proceeded on six months' combined leave from 14th April 1914, and Mr. Plymen, Agricultural Chemist, has been carrying on the duties of Principal, Agricultural College, since that date.

6. There were no changes among Extra-Assistant Directors. Rai Sahibs Tundilal and Bhayyalal and Messrs. Nandkishore and Hiralal continued in charge of the demonstration work in the Chhattisgarh, Berar, Nerbudda and Wainganga Divisions, respectively, throughout the year under report.

7. The total expenditure of the Department during the year was Rs. 4,43,000 against Rs. 4,58,000 of the last year.

8. While I was in charge of the Department I visited the Tharsa, Raipur, Akola and Adhartal (Jubbulpore) Farms, Nawagaon Cattle-Breeding Society and the Chandkhuri Cattle-Breeding Farm. Mr. King toured in the Zamindaris and Feudatory States of Ambagarh Chauki, Panabaras and Rajnandgaon, and attended the Cattle-show at Raipur and the Divisional Agricultural Conference at Powarkhera. Mr. Hullah visited the Jubbulpore and Tharsa Farms during his tenure of office. Messrs. Clouston, Evans and Allan attended the meeting of the Board of Agriculture in India held at Coimbatore in December 1913.

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PART II.—AGRICULTURAL EDUCATION.

The Agricultural College.

9. In spite of the extra work thrown upon Mr. Allan during the year by his being placed in charge of the work of the very heavy Southern Circle for six months, and, for a short time, of the duties of the Director, in addition to his own work, the standard of education at the College, as shown by the results of the examinations, was at least fully maintained. The progress of the Department has necessitated the Economic Botanist and the Agricultural Chemist spending more time on their research work and in observation tours in various parts of the Province; and, while substantial benefit resulted from their doing so, the teaching of the College had to be carried on to a larger extent by the Indian subordinate staff. It is creditable to these gentlemen and to the training they have received from their European heads that the general results of the College teaching have been so good. The College curriculum has recently been altered in the direction of concentrating Chemistry and Botany in the first two years, while more attention was paid to Agriculture, Veterinary and Engineering in the third year. While the results of this curriculum seem likely to be as satisfactory as can be expected from a three-year course, we have other important factors to consider. We are faced with the difficulty of recruiting a sufficient number of the agricultural castes, whose knowledge of English is almost always insufficient to enable them to make satisfactory progress in subjects of a scientific nature in the first year or two of their course. It would seem that the time has come to differentiate between the lower subordinate cadre, who will be drawn mainly from the agricultural castes and will be given a thorough practical knowledge of agriculture and its leading principles and of such subjects as Survey, Veterinary and Engineering, and the upper subordinate cadre, consisting of more highly trained and scientific men. This will be especially necessary, if, as may perhaps prove necessary, our farms are ultimately divided into seed and demonstration areas on the one side and experimental stations on the other. To secure this differentiation of functions, to give a higher training to the more intellectual students on the one side, and to utilise the excellent material afforded us by the agricultural castes on the other, it will be necessary to make some alteration in the existing methods of teaching. These considerations were before the Board of Agriculture at its last meeting, and no doubt influenced them in making a strong recommendation in favour of a course resembling that now in force at the Coimbatore College. Mr. Allan, who is naturally somewhat unwilling to recast his curriculum, which has only recently been worked out by him and is giving promising results, has proposed to superimpose on the existing course a separate Farmers' Course of the nature of the first two years of the Coimbatore system, by which the students will confine themselves to practical agriculture and its kindred subjects, such as Veterinary and Engineering, and will also pick up a certain amount of English in the process with the help of some special teaching. This, however, is intended to reach a different class of students from that already mentioned, *viz.*, the sons of land owners, who desire to manage their own land on improved principles. I do not wish, however, to form a definite decision on the matter, until I have had an opportunity of visiting the Coimbatore College after Mr. Allan's return, when I hope to be in a position to submit my recommendations. The framing of our agricultural curriculum so as to make the best possible use of the material is a most important matter, and the future success of the Department depends, perhaps, more on this than on any other single feature of its work. Last year, although a very large number of students entered, including many desirable agricultural candidates, almost all of them withdrew at the last moment for some unknown reason. An even larger number of candidates applied in May and June of this year, a surprisingly large proportion of whom were from districts outside the Nagpur and Berar Divisions. These, however, did not follow the example of the candidates of last year and almost all the suitable men have remained in the College. It is proposed, when the return of Mr. Evans and Mr. Allan from leave brings our cadre again up to strength, to attach a small area to the College as a College Demonstration Circle. Mr. Allan has also made the excellent suggestion that he should be permitted to attend as many of the more important agricultural meetings as he can. These two measures will undoubtedly go

very far to bring him into direct personal touch with the district and educational authorities, and with the cultivating communities of many of the districts, a highly desirable end.

PART III.—RESEARCH AND EXPERIMENT.

(a) *Agriculture.*

Nagpur Farm.

10. The Nagpur Experimental Farm suffered to some extent from the unfavourable season, the effects of which are usually felt more severely on the somewhat unsuitable soil of this farm than elsewhere. Mr. Allan's very interesting experiments in the inter-culture of wheat continued to show the advantage of this system, which was accentuated by the dryness of the season. Good results were obtained from under-draining a small portion of the *kharif* area with tiles. This is, however, a costly process, and it is moreover very doubtful for how many years the drains will retain their efficiency, with the amount of movement that takes place in the black cotton soil of the farm. Mr. Allan's efforts to improve the College Experimental Dairy met with success. The dairy buildings and processes are attractive in appearance, and show visitors, especially from the neighbouring suburb of Craddock Town, what can be done with milk products under modern methods. In the statement attached to his report Mr. Allan has worked out the profit and loss on the dairy during the year. After allowing fully for depreciation and interest charges, and taking credit for the value of manure and the growth of the young stock, the dairy is able to show a profit of Rs. 910. From this, however, the salary of the Assistant-in-charge, who is also employed as an Instructor of the College students in dairy management, has to be deducted. A somewhat larger number of animals would not entail any increase in the cost of supervision, while it would materially increase the profit. This dairy is thus an excellent object lesson in what can be done to furnish a milk supply on modern lines to the better class Indian residents of a large city. It will no doubt be necessary, if more animals are purchased, to increase the area under fodder crops, now that the grass supply of Telinkheri is being so extensively drawn upon by the Telinkheri dairy stock; and some of the land which has hitherto been leased to tenants, owing to our inability to make any other use of it, will have to be taken over and worked.

Telinkheri Farm.

11. The most important duty of this farm has been the provision of green fodder for the dairy herds. It has been found that Berseem gives heavy crops from October till April, while during the hot weather *san* hemp, cut before the stalks have grown hard, gives a comparatively heavy yield and is much relished by cattle. Generally speaking, it is clear that the solution of the dairy problem in large towns lies, so far as the purely agricultural aspect is concerned, in irrigated fodder. The Berseem and other fodder crops have been sold at cost price to the Gaolis' Co-operative Society, a fact which has to some extent reduced the farm receipts. Rosea cotton has been grown for the last five years, under continuous plant to plant selection with reference to ginning percentages, and has resulted in raising the original ginning percentage of 38 to 41·5 and 41·7. The farm report contains an interesting record of work in cotton crossing by the Farm Superintendent, Mr. Sawargaonkar. The receipts of the farm during the year under report amounted to Rs. 3,704, while the expenditure was Rs. 5,879.

Akola Farm.

12. This farm continued to be managed with complete success and at a profit. The Rosea seed commands such a high price locally, that the farm was enabled to earn Rs. 17,036 against charges of Rs. 11,826. When other kinds of improved seeds grown by the Department command as high a reputation as Rosea does in Berar, it will no doubt be possible to manage Government seed farms at a fair profit. In July last the Department obtained the President's trophy at the International Tropical Exhibition for Buri and Rosea cotton grown on the farm. The Deputy Director is now prepared to state his belief that nitrate of soda with cattle dung is a profitable manure for cotton. If this fertilizer

is taken up by the enterprising cultivators of Berar as rapidly as they have adopted other suggestions made by the Department, the local demand for nitrate will soon become considerable. The farm sold four tons of this fertilizer during the year, and Messrs. Allan Brothers, Cawnpore, have now agreed to stock nitrate on the farm for sale. The farm experiment in continuous cotton cropping has been going on for seven years without any apparent diminution of yield, and it therefore seems probable that the local practice of growing cotton year after year, which has become more frequent during recent years, is after all perfectly justifiable.

Raipur Farm.

13. A building has been erected to accommodate 20 cultivators attending the short course in agriculture. This course was attended by 37 men during the rains of 1913, of whom 34 passed. They were instructed in the transplantation of rice, in the cultivation of groundnut and sugarcane, the preparation of *gur* and the use of certain kinds of agricultural machinery.

The season was not a favourable one. The early sown rice was injured by a break after the first showers of the monsoon, and the rainfall of September was very short. Irrigation was, of course, given, but the amount of water available on the farm otherwise than by pumping is barely adequate, and the rice crop was not so good as usual. For this reason the single seedling method of transplantation gave less favourable results than transplantation by bunches. It has been found in Madras that single seedling transplantation is only of advantage when carried out fairly early in the season, and it is probably the heat of the latter portion of the rainy season that is the cause of this. An excellent cane crop was grown with irrigation supplied by the oil engines and pumps, but unfortunately, owing to the water of the Government tanks having been all required for rice, it was impossible for cultivators to sow more than a very small quantity of cane, and the local demand for seed fell to a minimum. The cane was, therefore, nearly all crushed and made into *gur*. This fact and the poor quality of the rice crop account for the comparatively small receipts of Rs. 6,680 against expenses of Rs. 11,185.

Tharsa Farm.

14. The rice crop, although it received abundant irrigation, was an exceedingly poor one, and there seems some reason to doubt whether the soil of the farm is suitable for rice. Further experience, however, is required, before a definite judgment can be passed on this point. Wheat grown after groundnut gave the very high net profit of Rs. 109 per acre, and it would seem that there is a promising future for this combination of crops in the Ramtek area, provided that the groundnut can be saved from the crows and jackals, which cause a good deal of injury. A perusal of the irrigation experiments on this farm causes some doubt in my mind whether our system of basing our irrigation experiments on a fixed number of waterings or a fixed amount of water given is a sound one, and I shall ask the Deputy Directors to consider whether it would not be better to prescribe for each plot the total amount of water, including rainfall, it should receive, the actual time of watering being fixed by the judgment of the Superintendent. At present the amount of cold weather rain, if considerable, puts a premium on the smaller quantities of irrigation water. Cane did exceedingly well on this farm, the maximum yield being 43 tons per acre of stripped cane, producing 5 tons of *gur*. The fruit farm is coming on very well, and the soil seems to suit orange trees, including the seedless orange trees brought from Bangalore. The receipts of the farm were Rs. 5,046 against an expenditure of Rs. 8,925.

Sindewahi Farm.

15. There are still several difficult questions to settle with regard to the arrangements for grazing and jungle management between Government and the tenants, who live in Sindewahi. These are under the joint consideration of the Deputy Commissioner and the Department; but it is possible that proposals for further acquisition of certain rights will have to be brought forward. The most troublesome question is the inadequacy of the water-supply. The Garmausi Tank is being improved by the Public Works Department, and the small tank in its catchment area is being

acquired. It is hoped that, with the supply rendered available by these measures, it will be possible to meet the requirements of the Farm for irrigation, while allowing villages entitled to receive a supply of water from the tank for as large an area as they were previously accustomed to irrigate. Most interesting results were obtained from the growing of cane and irrigated cotton on this farm. A maximum yield of stripped cane of 48 tons per acre was attained this year. A power crushing mill for cane has been bought and is being erected ready for next season. It is a great advantage for a cane factory, such as we hope to see established in the Chanda District at no distant date, to have as long a crushing season for its cane as possible, in order that the plant may be capable of dealing with the largest area possible; and it was therefore most encouraging to find that cane planted in the month of October, a date far earlier than is ever attempted by local cultivators, gave the very best results. Early planting enables the cane to outgrow the liability to damage from red-rot and from stem-borers, which are especially active on young canes between February and June. All three kinds of irrigated cotton did extremely well on the *wardi* soil, yields of 1,063 lbs. per acre being received from Buri, 1,335 lbs. from Rosea, and 790 from Cambodia. This last, with its high ginning percentage and its high price, may prove a very profitable crop in irrigated light soils in Chanda. Though much work is still needed, especially in the area required for experimental plots, in order to level up and equalise the soil, yet the farm has already proved a fair success from the point of view of seed production and demonstration, and has attracted the interest of many of the local cultivators. A most successful meeting with an attendance of 1,000 persons was held on the farm during the year. This number for so scantily populated a tract is remarkable. The receipts of the farm were Rs. 10,490 and the charges, many of which were merely on capital account, amounted to Rs. 21,209. I feel little doubt but that in course of time it will do more than pay its way.

Powarkhera Farm.

16. Perhaps the most noticeable feature of the experimental work on this farm was the marked superiority shown in the outturn of *kharif* crops sown by drill over those produced by the local method of broadcasting. This is important, in view of the tendency to sow cotton in the eastern portion of the district. Since the time when the Agricultural Department started its work, the custom of sowing of *kharif* crops in lines has now extended far to the east of Seoni-Malwa, which had for generations been its boundary. With the extension of cotton, the *kharif* crop of this part of Nerbudda valley is bound to become more important, and it is highly desirable to secure the efficiency of this type of cultivation in view of the severe losses that occurred after the famines from the infestation of inefficiently cultivated *kharif* fields with *kans* (Saccharum spontaneum). As might be expected, the benefit received by wheat from irrigation was not so marked as in previous years. The oil engine and pump are now raising large quantities of water from the well, which provides a sufficient supply. The supply of seed on the farm did not nearly suffice to meet the local requirements which were extensive, especially for Sukerhai Pissi, Malida gram, Purvi Maghai *til* and Rosea cotton. The rise of Rs. 2,000 in the farm receipts is partly due to the enhanced prices which the Department is now beginning to charge for selected seed. The short courses were attended by 30 men, of whom 24 came from Bhopal and Indore. A very large proportion of these latter were plucked, and only 12 of the 30 were given certificates. The use of the Nerbudda Reaper was taught to men from Bhopal and Indore. This reaper continues to do excellent work on the farm, although the unusually poor wheat harvest prevented any large increase in the demand.

Adhartal Farm.

17. The season here was an unfavourable one. The latter portion of the rains was unsuitable for *rabi* ploughing. The heat in October withered much of the young wheat and the crops towards the end of the season suffered to some extent from rain and hail. The very severe losses that befell the rest of the district, however, were not experienced on the farm, partly owing to the use of irrigation water, but mainly from the fact that this tract most fortunately escaped from the storms of rain and hail that fell at the end of the *rabi* harvest in the east of the district. The area was increased this year by about 81 acres, 50 of which were *haveli* land, intended for the production of wheat seed, and for experiment and demon-

stration in this locally important type of cultivation. There is reason to believe that the Jubbulpore *haveli* cultivation is exceedingly inefficient, and could be much improved by *bakharing* before sowing. A considerable addition was made to the farm buildings to provide quarters for demonstration *kamdars* and men under training. A handsome *pandal*, the gift of the District Councils of the Jubbulpore Division, has been erected for agricultural meetings. The farm has been greatly improved by the construction of roads and the levelling of fields, but much still remains to be done in the latter direction. Many of the plots are still so uneven as to make the experimental results of very doubtful validity. Sugarcane is doing well on this farm and the high profit made from crops of chillies is noteworthy, in view of the large quantities of this crop which the Province somewhat unnecessarily continues to import from outside. The attention of the Deputy Directors has been drawn to this fact, and efforts are being made to encourage cultivation of this profitable crop. Much of the farm expenditure is properly debitable to capital cost, and for this reason and on account of the small size of the farm, the ratio of income to expenditure is bound to be low for the present. The short courses were attended by 22 persons, drawn from almost every district in the Division.

(b) *Economic Botanist.*

18. The Economic Botanist is still investigating the rice, wheat and *juari* crops of the province. The latter, with its constant liability to cross fertilisation, has involved an extraordinary amount of work. The stage is now being approached at which some of the varieties selected by the Economic Botanist can be practically tested. A number of selected varieties have been made over to the farms; but no arrangements seem to have been made to inform the Economic Botanist of the way in which these have behaved. The Deputy Directors should arrange to supply the Economic Botanist with such reports as he may require on the varieties made over by him.

19. The preparation of fresh varieties by crossing has not, however, yet reached a stage at which any practical results are to be expected, though Mr. Graham is following several very interesting lines of research. The whole work of this section is still carried on in the face of the most disheartening difficulties of accommodation and all the research staff of the Department are anxiously watching the progress of the new laboratories.

20. Some practical work is being done in the dissemination of seed of the new varieties of chillies on an economic scale. What is wanted is the encouragement of cultivators, who do not grow chillies, to take up the cultivation of this crop. This may be brought about by the introduction of the variety of chillie that can be grown without irrigation. Chillies can be grown in the Central Provinces to yield a handsome profit, as will be seen from the remarks in paragraph 17 of this report. The improvement of the fruit trees of the Province is being attacked in a practical way. An experimental orange garden has been started close to the Victoria Technical Institute in the Maharajbagh, which, while greatly improving the appearance of this spot, so long the habitation of pie-dogs and Public Works Department coolies, will give useful data about orange growing and will certainly attract the notice of the fruit-growers of the Nagpur District, many of whom are really anxious to be taught. The possibilities of orange cultivation under the Ramtek tank are very extensive. The fruit and vegetable cultivation of the Satpura plateau are on a different footing. The cultivation of potatoes in Chhindwara and Mandla certainly goes back further than the year 1860: but nothing so far has been done to show the cultivators how to get the best results. Proposals have been made for a demonstration farm on a very small scale on leased land at Chhindwara, to encourage the local Kachhis to grow early vegetables and to form some estimate of the possibilities of peach, fig, plum and mango growing. Mr. Lowrie, I. F. S. (retired), has been very successful with his imported trees in a plot of ground adjoining the site of the proposed experimental plot.

(c) *Agricultural Chemist.*

21. The Agricultural Chemist was engaged on one or two definite and practical lines of work. He is following up the varietal, cultural and manurial experiments in cane growing on the different farms, by a series of analyses, to show the effects of the various differences on the chemical constituents of the juice. This is a very necessary check on the results obtained by weighments and by *gur* making, and has necessitated an exceedingly large number of analyses.

22. He is also helping in the work of the experimental dairy and paving the way for the control of the purity of the milk-supply, by investigating the constituents of cows' and buffaloes' milk. There is an accepted standard of purity for cows' milk in England, but, owing to the greater natural richness of buffaloes' milk, no such standard has yet been created for India. Work of a useful nature is also being done in attempting to produce a cheap but wholesome adulterant for *ghi*. The difficulty, however, lies in the fact that oils which are solid in a cold climate are liquid in India, and the lack of solidity in an adulterated *ghi* is a serious bar to its acceptability. Mr. Plymen has also been consulted on numerous occasions, and especially since the outbreak of the war caused a scarcity of sizing, and other materials, by millowners and other persons on various matters involving a knowledge of industrial chemistry. Besides this, Mr. Plymen took a considerable share in the College teaching, and during Mr. Allan's absence on leave acted as Principal.

(d) *Entomology.*

Assistant Entomologist.

23. The Assistant Entomologist, Mr. Ratiram Khamparia, attended a large number of agricultural meetings, and was of distinct help to the Department in keeping a close watch on the ticks which had infested the dairy and breeding herds at Telinkheri. It was discovered that the most effective dip was a mixture of kerosine emulsion and Cooper's Dip. Mr. Ratiram also made the useful discovery that the surface caterpillars which had been injuring the Berseem crop could be completely extirpated by a heavy watering. This drove the caterpillars from their hiding places in the ground, and the birds were not long in making an end of them. A set of experimental plots to test the efficacy of *bhendi* as a trap crop for boll-worm were observed during the year, and seen to promise some fairly definite indications of the efficacy of this device.

(e) *Sericulture.*

24. No sericultural operations were undertaken during the year.

(f) *Cattle-breeding and dairy-farming.*

Telinkheri Farm

25. The Telinkheri Breeding and Dairy Farm had to record somewhat serious losses from tick fever following rinderpest. Ticks appear to be very frequently present on most Indian cattle, but the kind of fever conveyed by them has very little effect on the animals, unless they are already weakened by other disease. The Assistant Entomologist has kept a careful watch for ticks during the recent hot weather and early rains, when fear was entertained of their increasing in numbers. Fortunately, however, there have so far been no signs of this, and it is hoped that the energetic measures of spraying and disinfecting which have been carried out, coupled with the close and careful watch kept against rinderpest or other infection, will continue to keep the Farm free from disease. In previous years the Telinkheri Cattle-Breeding Farm had succeeded in showing a fair profit, but this year there was a loss of Rs. 2,341 The Government Dairy herd at Telinkheri consists of Delhi and Jaffarabadi buffaloes, Gaolao and Punjab cows together with a Montogomery and an Ayrshire bull. Experiments are being carried out in cattle-feeding from its economic aspect, and in the milk yielding qualities of the various types of animal. It has been shown that even the local cow, a selected type of Gaolao, is not a profitable milch animal, and that the Delhi buffalo, though its yield falls off when it is transferred to the less suitable climate of Central India,

is still a larger yielder than the local buffalo. A dairy herd consisting entirely of buffaloes, if a liberal supply of green fodder be available, can be managed at a very fair profit. Several calves have been obtained by crossing the local buffaloes with a Delhi bull and it is hoped that these will show milk-yielding qualities superior to those of local buffaloes.

Gaolis' Society.

26. The Society of Gaolis still succeeded in dragging on its chequered and troublesome existence, the continuance of which is far more a testimony to the tact of Mr. Clouston and his staff than to the co-operative qualities of the Gaolis. The latter gave trouble in every possible way, by grazing their animals in the Government bir, stealing fodder and removing milch animals from the herd. Such natural honesty as these men or their ancestors may have originally possessed has disappeared in their struggle to make a living amidst the difficulties of a poor milk yield, inadequate grazing and exorbitant money-lenders. They have for long been the Ishmaels of the city and Civil Station, complained against not less on account of the damage their animals do to gardens, than of the dishonesty which they practise in their profession of selling milk. So long as they remain at Telinkheri, the Department are prepared to control them, as far as possible, but I strongly deprecate any attempt to turn over to them the management of the dairy, and I foresee a time at which the main source of supply will be from animals owned by the contractor. Every indulgence has been shown them, and, if they fail, it will be due to the fact that their existence on their present lines is an obvious anachronism. They have paid off almost the whole of the money which they borrowed from the Central Bank, and, although their takings are at a very low level in the hot weather and early rains, at which time a large proportion of animals are in calf, they contrive to make a not inconsiderable profit, taking one month with another. Milk was sold by the contractor to the public at 6 seers, although the bazaar price for a far more doubtful article ran as high as 5 seers between the months of May and August.

Cattle improvement in Chhattisgarh.

27. The inefficiency of the plough cattle in Chhattisgarh has long been an obstacle to the introduction of improved methods of cultivation and has attracted the attention of the Local Administration. It is hoped that our present plan of compaign, in which we have enlisted the help of private persons and Co-operative Societies as cattle-breeders, and our demonstration of the growth of irrigated fodder will lead us to the solution of the difficulty.

The Government Cattle Farm at Chandkhuri is now carrying a herd of 111 head of cattle. These are of the breed found in the Zamindaris to the south and east of Chhattisgarh, which no doubt represent the original type of Chhattisgarh cattle, before overwork and under-feeding reduced them to their present miserable state. The farm consists mainly of *bhata* land, much of which is, however, irrigable from the Kurud Tank. This area is typical of the numerous fuel and fodder reserves scattered over the districts of Raipur and Bilaspur. Many of these will be commanded by the large irrigation schemes now under construction or investigation. When this is the case, they should afford most useful centres of demonstration. Irrigated fodder for cattle and other valuable crops can be grown to great advantage on *bhata* land, where water is available. At present the main difficulty experienced by managers of private cattle breeding farms is the lack of bulls. A certain number of semi-wild cattle have been captured, and one or two of these have been made available, but it is probable that, for a long time to come, private cattle-breeding farms will have to rely on Chandkhuri for their bulls.

28. The Nawagaon Co-operative Society is well managed and has succeeded in spreading an interest in cattle-breeding in many parts of the district, though it can scarcely be called truly co-operative. A small society at Khandwa which has leased the Pachera fuel and fodder reserves of 288 acres from Government is on much more co-operative lines. Its members possess 40 cows, of which 20 are the property of the malguzar, who is an enlightened and progressive cultivator. There are also five cattle farms in the zamindaris, most of which were visited by

the Deputy Director during the year. As more bulls become available and irrigation facilities extend, there is no doubt but that the number of private co-operative cattle-breeding farms will extend very largely in Chhattisgarh and a useful type of animal, not too large for the comparatively poor grazing available, will be placed at the disposal of the people.

Sheep-breeding.

29. Investigation into the diseases of sheep and their maintenance and breeding is still being continued. It has been shown that one great requisite for sheep is dry grazing ground for use in the rains. Of the flock kept on the dry and stony pasture of Telinkheri, only eight per cent died, while in the damper ground at Sindewahi the loss amounted to 27 per cent. The closest and most constant supervision is needed, especially in the rains, to check the spread of maggots and the numerous obscure diseases to which sheep seem liable in this part of India. The merino rams can hardly be called a success. Out of the three imported, two are dead and the third has so far failed to perform the functions expected of him.

Powarkhera Farm and private farms in connection with it.

30. The Powarkhera Farm continued to do well during the year, and sold five bulls for the use of private cattle-farms in the Northern Circle. There was a severe outbreak of hemorrhagic septicæmia in villages surrounding this farm, but owing to the precautions taken only one of the farm animals died of the disease. Inoculation, segregation and spraying for ticks were resorted to. Of the six private cattle-farms in the Northern Circle, four possessed bulls obtained from one or other of the Government farms. It is too early to speak positively about the success of these small farms, but the owners are keen and interested and the Agricultural and Veterinary Departments have been able to afford fairly close supervision. Much is hoped from the extension of this system.

PART IV.—DEMONSTRATION, &C.

Berar Division.

31. The main feature of demonstration work in Berar was the distribution of Rosea seed through private seed farms, organised on a co-operative basis. This form of co-operation has now arrived at a most interesting stage in its development. There are some 400 private cotton seed farms in the Division, which grew nearly 2 million pounds of Rosea seed last year. This was sufficient to sow about 200,000 acres, with an additional profit to the growers of from 10 to 12 lakhs of rupees during the coming year. These seed-farms are grouped in Co-operative Unions, of which four have been registered under the Act, while 18 are still unregistered. Departmental supervision is concentrated on the central farms of these Unions, the channel through which the seed from the Akola Farm reaches the private farms and ultimately the general public. The branch farms of each Union are inspected by a *kamdar* trained by the Department, but employed by the Union under the supervision of two of its members. This agency secures the purity of the seed and the adequacy of the cultivation. The staff is paid for by contributions made by individual members, at an acreage rate, from the profits on the sale of their seed. It is also proposed that the Central Bank, which is the general financing agency for all co-operative institutions in the Division, should undertake some control of the work of the Unions, over and above the expert agricultural supervision afforded by the Department, and an expert staff for the use of the bank is now being arranged for. The general lines are so far fairly well accepted; but there are two serious difficulties. Not many of the best co-operators are expert agriculturists and few of the best agricultural members have much experience in co-operation. This is a source of weakness for the present; and the true remedy seems to lie in an extension of the system of co-operative credit in the Division. Co-operative credit is the simplest form of co-operation, the most readily intelligible and the most directly educative. It will be far more easy to teach the agriculturists co-operation, than to give the co-operators, many of whom belong to the urban educated class, a knowledge of agriculture. As the idea of co-operation permeates the areas occupied by the different Unions, it will be possible to put more and more of them on a truly co-operative basis. The staff of the Unions are paid for and other general expenses are met by the profit on the sale of seed; and several Unions are also beginning to earn

quite appreciable sums as commission on the sale of implements. The Sonwadhona Union made Rs. 64 from this source last year. These Unions fulfil other useful functions. The Khamgaon Union managed a ploughing competition and nearly all the Unions took an active part in the dissemination of agricultural information.

32. The annual divisional meeting at Akola was again largely attended. In the competition for the highest ginning percentage of Rosea, two samples were produced, ginning at over 42 per cent. It is not unnatural, therefore, that this seed should sell from 25 to 46 rupees per *khandi* against a price of Rs. 14 for the ordinary local *jadi*. Other important lines of improvement comprise the sale of Saoner, Ramkel and Chapti *juar*. The growing of groundnuts is also being taken up in Berar, now that the Department have introduced a seed which is capable of being grown without irrigation.

Chhattisgarh Division.

33. The use of mosquito nets and quinine by the demonstration staff, which was enjoined on them two years ago, has again had its effect in reducing the amount of malaria from which they suffer in the rains. The District staff continue to supervise the administrative arrangements for the introduction of rice transplantation, which is the most important feature of demonstration in Chhattisgarh. In fact, it would not be incorrect to say that the District staff make themselves responsible for the quantity and the agricultural staff for the quality of the work. The Departmental staff consisted of 8 assistants and 32 *kamdars*, and the area transplanted amounted to 30,194 acres. Transplantation was widely pushed by the Land Records staff, and partly owing to lack of judgment on their part in one or two cases and partly owing to undue keenness on the part of a few cultivators, transplantation was undertaken in land inadequately protected by small village tanks. With the partial failure of the rains, these areas naturally suffered; but the cultivators who transplanted their crop in areas protected by Government works or by the larger village tanks made a very large profit. The average increase over broadcasted rice shown by 54 experiments amounted to 981 lbs per acre, which, with the saving in seed arising from the single seedling method of transplantation, gives a total profit in favour of this method of Rs. 26 per acre. On the basis of Rs. 15 advantage in favour of transplantation, which is as high as Mr. Clouston is prepared to accept, 4½ lakhs rupees were added to the earnings of cultivators last year. A record rice crop of 5,620 lbs. was reaped this year by the malguzar of Amdi near Drug. The total area sufficiently protected to justify transplantation is limited, and in a year or two we should be approaching the maximum, were it not for the fact that irrigation from the Mahanadi Canal will begin during the coming cold weather and will be in full swing in another year or two from now. When this stage is reached, it will be necessary to reconsider the position; and I am inclined to think that the initiative should be placed more and more in the hands of the District staff, and the role of the Agricultural Department should become more and more one of inspection and advice, of training the necessary staff and of supplying improved rice seed. No record has been maintained by the Department of the area placed under groundnut this season, but it is undoubtedly a considerable one and probably amounts to two thousand acres at the least. This crop was unknown in Chhattisgarh before the Department introduced it. As usual, a party of 35 cultivators was taken to inspect rice growing villages in Bhandara and Balaghat during the rains. A more careful selection was made this year, in order to confine the party entirely to cultivators. This form of agricultural demonstration never fails to impress even the most ignorant and backward.

34. Cane cultivation received a serious set-back, owing to almost all the water in Government tanks being required to save the rice crops, and there was also little or no water to spare for irrigating wheat. An important departure has been made in starting seed farms for selected Gurmatia rice at Amdi and Khandwa. This was undertaken at the special request of certain leading cultivators two years ago. In addition to the superior seed obtainable, they anticipated a considerable benefit, owing to the freedom of the seed from wild rice, which in many cases takes up as much as half the space available in the field. As the grains of this rice fall from the stem long before the main crop-

is reaped, it causes considerable loss; but the benefit anticipated will not be achieved, unless the pure seed is sown in fields entirely free from wild rice, the seed of which, after falling, remains in the ground until the next rains.

Nagpur Division.

35. The single seedling method of transplanting rice was demonstrated in the Chanda and Bhandara Districts; 2,250 acres were sown by this method in the first and 210 in the second district, all in areas protected by Government tanks. Under ordinary circumstances, the outturn is larger by the single seedling method, while it only requires 25 lbs. of seed per acre, against 100 lbs. sown if the seedlings are transplanted in bunches. The Gurmatia variety of rice from Chhattisgarh, though coarse, is a far heavier yielder than any of the local varieties; this is being taken up in the Wainganga tract; 16,500 lbs. of this variety were distributed in the Chanda District alone.

36. In the Wainganga tract, as elsewhere, the season was an unfavourable one for cane. The crop was affected to some extent by the lack of water in the Ghorajheri Tank area, but the damage was not very serious. Under the Ramtek Tank the losses were far heavier, and there is a decline of 43 per cent in the area sown this year. This was not due to any failure of the water-supply, which was ample, but to a lack of understanding between the staff of the Agricultural and Irrigation Departments, and to the ignorance of the cultivators, who in most cases waited until their crops were actually beginning to suffer from drought, before they applied for water. It was naturally impossible to supply water to a number of scattered plots immediately on demand and the damage in such cases was often very serious. The cultivators in some cases allowed their crops to be grazed down by cattle, and fed their plough animals on the oil cake supplied for manuring the sugarcane. The fault primarily lay with the Divisional Superintendent of Agriculture, who should have observed the difficulty and made proper arrangements. This year the Deputy Director, in consultation with the officers of the Irrigation Department, has arranged for the regular weekly irrigation of all sugarcane plots. This system is reported to have worked smoothly throughout the past season, and it is to be hoped that the introduction of this important crop may soon be placed again on its former promising basis.

Irrigated cotton and sugarcane in Chanda.

37. Groundnut was a successful crop in Chanda, yields of as high as 2,300 lbs. per acre being reported. This crop and sugarcane require protection from wild animals in jungle areas, and, in spite of the comparative poverty of the Chanda cultivators, a considerable amount of pig-proof fencing was purchased for this purpose. Cotton seed sufficient to sow 150 acres was distributed in the area under the Asola Tank. The results of next season's work should afford a useful indication of the extent to which this crop is likely to succeed in the hands of local cultivators on light irrigated soil, not only in Chanda but in Chhattisgarh. Should it prove possible to grow cotton under irrigation on the light *matasi* soils of Chhattisgarh, irrigation receipts will expand, the distribution of water between the *kharif* and *rabi* crops will be improved, and an important addition made to the export crops of this extensive area. A plot of one acre was treated with sullage from the Wardha drainage scheme with great success. A profit of Rs. 350 was derived from irrigated fodder, vegetables and garden crops. It is too early, however, to say whether the difficulty of soil fouling can be overcome.

38. Mr. McGlashan, the concessionaire of the sugarcane estate in the Ghorajheri Tank area, made satisfactory progress in clearing the ground for cultivation. A small experimental area of 12 acres of cane was grown by him and the results of the crop exceeded his expectations. He has been of the greatest help to the Department as a cane expert, and has placed his most interesting experimental results freely at our disposal. In return, the Department have done their utmost to facilitate his work. The presence of a highly skilled sugarcane expert like Mr. McGlashan near to our most important sugarcane farm is almost as advantageous to the Department as the employment of a

trained man under Government, and it will be most unfortunate if the inability to obtain a sufficient supply of water for his cane crop, owing to leakage in the main channel, throws difficulties in his way. Proposals are, however, under consideration in the Irrigation Department for preventing leakage in the channel, and it is hoped that a definite scheme will have been decided upon soon after the issue of this report.

General arrangements for demonstration in the Northern Circle.

39. In the Northern Circle, the connection between the Department and the cultivators was maintained by two different methods. Where co-operation is strong and well organized, as in most parts of the Jubbulpore District, in Hoshangabad and in Betul, the co-operative organisation is made use of. In other districts, sub-associations of the District Agricultural Association are started, which will, it is hoped, eventually be absorbed in the co-operative organisation, when it reaches those districts. There were 9 of these sub-associations in the Nerbudda and 4 in the Jubbulpore Division, nearly all of which are doing useful work. Of the demonstration plots, those for which land-owners supplied labour, etc., in the Hoshangabad Division did not do so well as the similar plots in Seoni and Jubbulpore, where there are an especially large number of enlightened and energetic malguzars, who give much help to the Department. The plots managed by *kamdars* were especially successful in Jubbulpore. One of these *kamdars*, by name Shamli, deserves mention for his success in the introduction of iron cane mills and rice transplantation.

Co-operative seed distribution.

40. There were 24 cotton seed farms in the Nerbudda Division, which produced Rosea seed in Nimar and West Hoshangabad and Saugor Jari in the east of the district. It will soon be necessary to place these under co-operative control. There were 60 wheat seed farms in the Jubbulpore Division and 23 in the Nerbudda Division which were regularly inspected by the Department, besides a number of smaller plots. The Jubbulpore seed farms continue on a co-operative basis and the cost of their administration is found from the interest of 25 per cent paid by the members on the seed taken by them. These farms received a severe set-back during the year, owing to the almost complete destruction of the wheat crop over the east of the Jubbulpore District by hail and rain. Only six farms had seed to sell and supplies had to be brought from the Hoshangabad District, where the crop was better. The Deputy Director imported 2,707 maunds of wheat suitable for seed from Seoni-Malwa, and sold it at 8¾ seers for the rupee, through the Sehora Bank, which made a small profit on the transaction. The co-operative farm at Rondhi in Betul was well managed during the year, thanks to the interest taken by local malguzars and to Mr. Hemingway's close supervision.

Miscellaneous details of work.

41. The most noticeable lines of demonstration in the Northern Circle continue to be the improved varieties of wheat, Purvi Maghai *til*, cotton, groundnut and, in Jubbulpore, transplanted rice. In addition to Sukerhai Pissi, the demand for which is largely increasing, the value of Bansi wheat in irrigated areas is becoming largely recognised. Nearly 4,000 acres of Purvi Maghai *til* are sown in the Seoni-Malwa Tahsil and the local kind has been practically ousted. The improved variety fetches Rs. 7-8-0 per *pakki maui* more than the local sort.

42. Groundnut is being more widely sown in Nimar. Another promising crop is the variety of gram known as Malida, which gives a heavy outturn and was valued by Messrs. Ralli Brothers at Rs. 7-10-0 per cwt. against Rs. 6-2-0 for Yellow Gujrat gram. The destruction of pig in the Seoni and Harda Tahsils still continued, and in this comparatively small area 27,000 animals have been destroyed in the last three years. There are but few pig left here, except in the extensive Government jungles, where there is no possibility of extirpating them by any methods which the Department have hitherto been able to devise. The inhabitants of villages in the open country, where pig have practically disappeared, now object to pay for the destruction of pig in the jungly tracts; and have very unwisely decided to close down operations. The result of this will be, that in two or three years' time, the work will have to be done over again. The attention of the Deputy Commissioner has been called to this.

43. Could the difficulty of insufficient water-supply in the Government irrigation tanks in Jubbulpore be overcome, there would be good prospects for sugar growing in that district. The rail-borne trade returns already show a falling off in the import of *gur*, which is attributed to increased local production. The cultivators are very anxious to extend cane cultivation, and, while this is not being pushed by the Department, growers are being advised to confine their attention to the thin canes like *khari*, which can mature with a minimum of irrigation. The old stone cane mill or *kolhu* has within a space of three years been practically ousted. Transplantation of rice is extending and the demand for superior varieties is increasing. A really efficient tank in the Jubbulpore District would entirely revo'utionise the character of the cultivation in the area commanded by it. A demand for *mahua* refuse from the Katni Distillery has begun to spring up. The demonstration of *kharif* cultivation by drill and bullock hoe in the Kanthar tract of the Patan Tahsil continues to be carried on. Mr. Ritchie has come to the conclusion, that it will be best to concentrate efforts on villages where *kharif* is more especially important, as, in villages where *rabi* tends to predominate, the people will not utilise the breaks in rains to hoe the *kharif*. The earlier sowing of *kharif* in this tract gives the best results.

44. Considerable progress was made in the policy of handing over the sale of agricultural implements to co-operative bodies. The Central Bank at Betul sold more than Rs. 8,000 worth of implements this year, and one of the Betul societies purchased a reaper for the co-operative use of its members. The sale of seeds and implements has also been undertaken by the co-operative organisation in the Sohagpur Tahsil. Implements are stocked by the Sihora and Jubbulpore Central Banks as agents to Messrs. Octavius Steel & Co.

45. It had till recently been a common reproach against the Agricultural Department, that the effect of their teaching was always least visible in the areas immediately surrounding their own farms. This is no longer true regarding the farms at Powarkhera and Adhartal; the way in which various kinds of improved crops have been taken up in the area immediately adjoining the latter farm is very noticeable; an informal association of cultivators holding land immediately round the Powarkhera Farm has been formed, and much has been done in the distribution of improved seed in adjoining villages.

Notice of Officials and Non-Officials.

(a) *Northern Circle.*

46. Mr. Nandkishore, Extra-Assistant-Director, continued to earn the commendations of his Deputy Director for good work. Among assistants, Lakshmi Narain and Ghatpande were perhaps the best. I have to record with deep regret the death of Mr. Ganpati Narain, Superintendent, Adhartal Farm, which took place just after the close of the year. This officer was a very painstaking and energetic worker of the old school and had earned the respect and liking of all members of the Department who were brought into contact with him. Among officials of other Departments, we have to acknowledge the help of Messrs. Mehar Ali at Burhanpur, Gokul Prasad, Tahsildar, Hoshangabad, Wali Mohammad, Extra-Assistant Commissioner, Seoni, Chhattar Singh, Manager of the Dewan Estate, Seoni, and Aduram Chaudry, Tahsildar, Amarwara.

The leading non-official helpers were Pandit Appaji Trimbak, Secretary of the Chaurai Agricultural Sub-Association, Seth Harishanker of Harda, Mr. Shyam Sundar Bhargava of Jubbulpore, who is much interested in cattle breeding, Rai Sahib Gurudin Misra, who helped us with our seed farms in Sihora; Rai Bahadur Vishwanath Singh of Seoni, Rai Bahadur Bishun Dutt Shukul, and Rao Sahib Dajiba Govind Dongre of Palsud are old friends of the Department and continued their efforts in our behalf.

(b) *Southern Circle.*

Rai Sahibs Tundilal Powar and Bhaiyalal Dube continued to merit the high encomiums which have been passed on them in previous years. In addition to the officers mentioned in the body of the report, Messrs. Lal Mahomed Sawargaonkar and Joshi did well, and Mr. Mehta, though young and inexperienced, worked very hard at the Telinkheri dairy.

Messrs. Krishna Sewak, Tahsildar; and Abdul Rahman, Additional Tahsildar, were of special help in transplantation work in Chhattisgarh. In Berar, our thanks are due to Mr. Gupte, Tahsildar of Khamgaon, and Mr. Deshpande, Tahsildar of Ellichpur.

Among non-officials, Khan Sahib Israil Talibuddin and Munshi Raghubar Dayal of Baloda were of great assistance to the Department in Raipur, and Mr. Byramjee Pestonjee is entitled to our thanks for his management of the Telinkheri dairy. Mr. Yeshwant Rao Deshmukh of Khamgaon was very helpful as an organiser.

I desire to take this opportunity on behalf of the Department of thanking Messrs. Crawford, Bell and Pantin for their help in popularising rice transplantation in Chhattisgarh; and Messrs. Chapman, Jatar, Hemingway, Gaskin and Trench for their assistance and support in our work generally. It is unnecessary to add much to what has already been said in the body of the report regarding the work of the Deputy Directors, Messrs. Clouston and Evans. Successive Directors have learned to rely confidently on the unvarying success of their work, secured by hard work, common-sense, and high professional knowledge. Mr. Ritchie, who has recently joined the Department, has held charge of the Northern Circle during Mr. Evans' absence with credit to himself.

PART V.—AGRICULTURAL ENGINEERING.

Distribution of implements.

47. The policy of handing over the distribution of improved implements to private agencies was continued and extended. In Berar, Messrs. Burn & Co. have started a depôt at Akola, where they employ a trained salesman and a certificated mechanic under the control of their Assistant Engineer. No less than 240 turn-wrest ploughs were sold for Rs. 8,640 in the Berar Division alone. There are 22 agencies for the sale of the implements in this Division, some managed by co-operative bodies and some by members of the Agricultural Associations. There were 24 power-driven ginning plants at work in Berar, where it was decided by a Committee of the Divisional Association that it is absolutely necessary for every Seed Farm Union to possess its own oil engine and gins. Many of these engines are also used to run fodder cutters and flour mills. Implements valued at Rs. 42,382 were sold by the Department during the year in the Southern Circle, among which were 30 fodder cutters, 44 iron cane mills, 266 turn-wrest ploughs, 9 oil engines and 17 gins, together with 5,160 yards of pig-proof fencing.

48. In the Northern Circle also the sale of implements has greatly increased. Here the monsoon plough, which has been found to be particularly useful in the eradication of *kans*, is as much in favour as the turn-wrest plough is in the Southern Circle. No less than 415 of these were sold. In all 1,766 implements or parts of implements were sold.

PART VI.—PUBLICATION AND DISSEMINATION OF AGRICULTURAL INFORMATION.

Agricultural and Co-operative Gazette.

49. The Agricultural Gazette continued to be published during the year. The number of copies in circulation has during the year decreased from 6,249 to 5,922, of which 3,216 were Hindi, 2,356 Marathi and 350 English. The decrease is due principally to subscribers who were persistent defaulters being struck off the list.

Cotton Returns.

50. The weekly cotton returns continued to be collected and circulated during the year. Slight modifications and improvements were introduced. The thanks of the Department are due to the press and mill managers and to cotton market committees for their cordial help and co-operation.

PART VII.—MISCELLANEOUS.

51. The Museum continued to improve, and added to its Natural History collection. The birds, to which most attention has been so far paid, are now in many cases exhibited in natural surroundings, and drawings and sections are

displayed illustrative of the natural features on which they are classified. Some real interest has been awakened among many of the visitors in this section and the numbers are well maintained. In view of the increasing tendency to add a more real element to Indian education and of the proposals to give courses in Zoology and Botany in one or two of the recently planned Universities, the Natural History section of the Nagpur Museum will afford much help as a basis, if it be decided to attempt a course in Zoology at the proposed University.

52. The large number of coins, in no way connected with the Province or its history, which are continually being received by the Museum under existing orders, raise the question whether they are worth the extra trouble and heavy expense entailed in cataloguing, arranging and safeguarding them. No one in the Province ever looks at them; and from the educational point of view, it is doubtful how far such a collection, which contains a very large number of coins belonging to certain periods and is blank or nearly so for others, can be of use to students of numismatology, in the unlikely event of the Province producing any such. For the purpose of ordinary university students, a small well-arranged collection, displayed in a few cases, would be far better adapted than a large number of coins kept in safes as at present. The present building has become obviously inadequate for a Provincial Museum. The roof leaks and requires complete renewal. The rooms available are also far too small. There is no possibility of displaying the large fauna, for which the Province is famous in the world of sport, though their numbers have been sadly diminished by the excessive demands made on the forests of Central Provinces by sportsmen all over India. The alternative proposals at present under consideration are :—

(1) To hand over the building to the University and to erect a new building for the Museum in the Maharajbagh.

(2) To improve the existing Museum building or to provide a new one near the present site, so as to form a member of the block of University buildings which may possibly be erected there.

There are arguments for and against each proposal: and the matter cannot in any case be settled till the orders of Government on the recommendations of the University Committee are finally decided on.

53. Great credit is due to Mr. Graham and Mr. D'Abreu, the Curator and Assistant Curator, for the zeal and interest with which they continue to carry on the work of the Museum, especially of the Natural History section.

54. The Raipur Museum was visited by 92,825 persons during the year. Some stuffed birds were presented by the Nagpur Museum. The number of weaving students increased owing to the provision of larger stipends, but it is not expected that much real improvement will result, until the arrival of the textile expert from England.

Menagerie.

55. The Maharajbagh Menagerie, which is now in charge of a Veterinary Assistant (Mr. P. S. Shukla), under the control of the Principal of the Agricultural College, continued to make progress, and, with the greatly improved Maharajbagh garden, forms an attractive *ensemble*. Mr. Shukla takes a real interest in this part of his work, while he does his full share of duty in attending to the animals owned by the Department in their various farms in and round Nagpur. Two new open air cages for large carnivora have been constructed during the year, and are no less appreciated by their inmates than by the spectators. The present dark and unhealthy monkey house will shortly be replaced by a very much more suitable structure, and it is also in contemplation to divert the nala that cuts up the deer paddock and renders the escape of the animals possible. This and the inclusion of two small extra pieces of ground will greatly improve the appearance of this portion of the garden and of the Sitabaldi cross roads.

C. E. LOW,

Director of Agriculture and Industries,

Central Provinces.

Govt. Press, Nagpur :—No. 1290, Dir. of R. & I.—2-11-14.—600.

REPORT

ON THE WORKING OF THE

DEPARTMENT OF AGRICULTURE

OF THE

CENTRAL PROVINCES,

FOR THE YEAR

1914-15.

Agents for the Sale of Books published by the Central Provinces Administration.

IN ENGLAND.

CONSTABLE & CO., 10, Orange Street, Leicester Square, London, W. C.
P. S. KING & SON, 9, Bridge Street, Westminster, London, S. W.
KEGAN PAUL, TRENCH, TRUBNER & CO., 68/74, Carter Lane, London, E. C., and 25, Museum Street, London, W. C.
B. QUARITCH, 11, Grafton Street, New Bond Street, London, W.
GRINDLAY & CO., 54, Parliament Street, London, S. W.
DEIGHTON BELL & CO., LD., Cambridge.
B. H. BLACKWELL, 50 & 51, Broad Street, Oxford.
HENRY S. KING & CO., 65, Cornhill, London, E. C.
LUZAC & CO., 46, Great Russell Street, London.
W. THACKER & CO., 2, Creed Lane, London, E. C.
OLIVER & BOYD, Tweeddale Court, Edinburgh.
E. PONSONBY, LIMITED, 116, Grafton Street, Dublin.
T FISHER UNWIN, LIMITED, 1, Adelphi Terrace, London, W. C.

ON THE CONTINENT.

ERNEST LEROUX, 28, Rue Bonaparte, Paris.
MARTINUS NIJHOFF, The Hague.

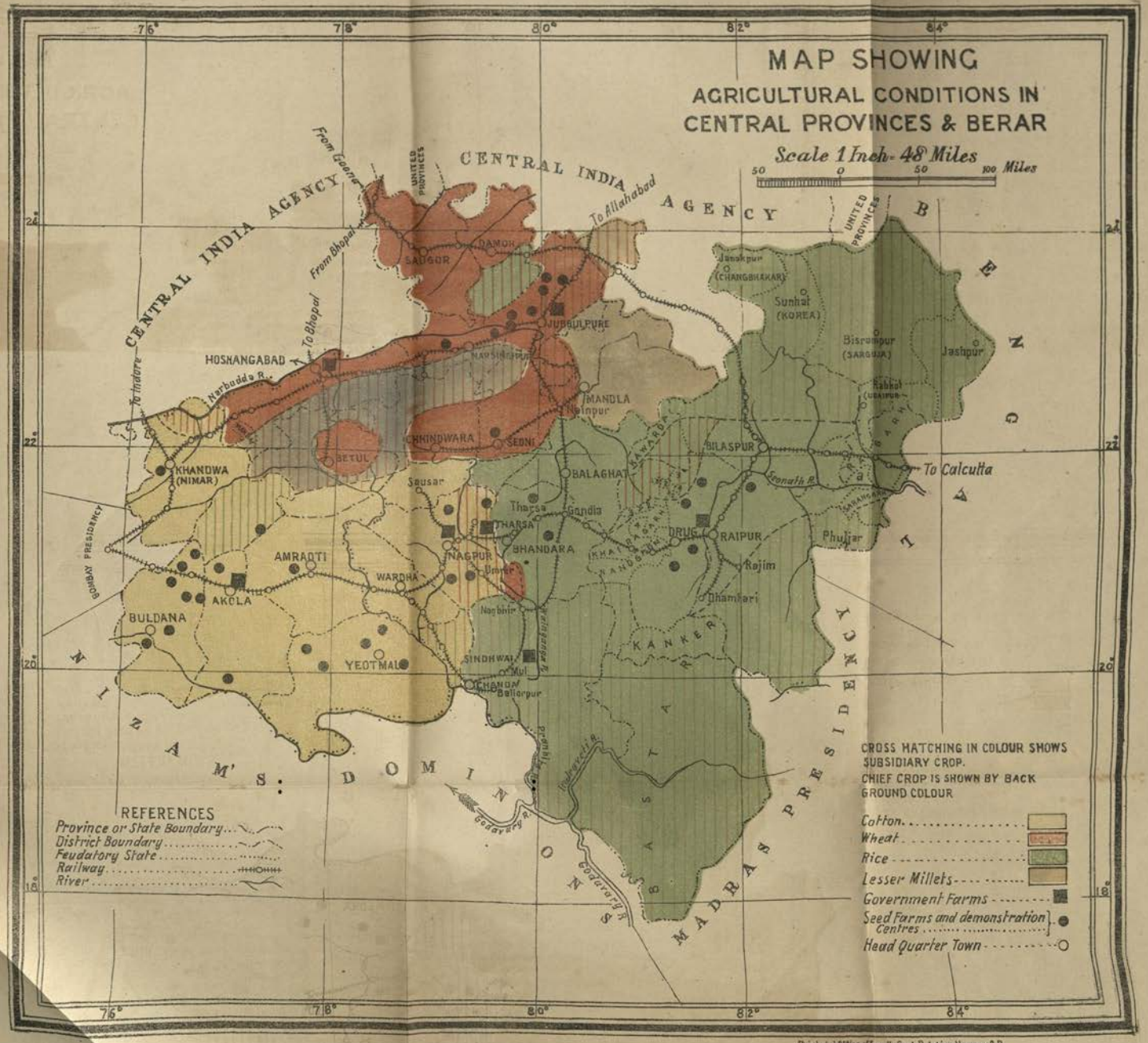
IN INDIA AND THE COLONIES.

THACKER, SPINK & CO., Calcutta and Simla
NEWMAN & CO., Calcutta.
R. CAMBRAY & CO., Calcutta.
S. K. LAHIRI & CO., Calcutta.
BUTTERWORTH & CO. (INDIA), LIMITED, 8/2, Hastings Street, Calcutta.
CALCUTTA SCHOOL BOOK & USEFUL LITERATURE SOCIETY, Calcutta.
THE WELDON LIBRARY, 18/5, Chowringhee Road, Calcutta.
M. C. SIRCAR & SONS, 75, Harrison Road, Calcutta.
A. J. COMBRIDGE & CO., Bombay.
THACKER & CO., LD., Bombay.
D. B. TARAPOREVALA, SONS & CO., Bombay.
RADHABAI ATMARAM SAGOON, Bombay.
SUNDER PANDURANG, 25, Kalbadevi Road, Bombay.
RAMCHANDRA GOVIND & SON, Booksellers, Kalbadevi, Bombay.
A. J. COMBRIDGE & CO., Madras.
HIGGINBOTHAM & CO., Madras.
V. KALYANARAM IYER & CO., Madras.
G. A. NATESAN & CO., Madras.
S. MURTHY & CO., Madras.
THOMPSON & CO., Madras.
TEMPLE & CO., Madras.
RAI SAHIB M. GULAB SINGH & SONS, Lahore.
THE PROPRIETOR, NEWAL KISHORE PRESS, Lucknow.
N. B. MATHUR, SUPERINTENDENT, NAZAIR KANUN HIND PRESS, Allahabad.
A. H. WHEELER & CO., Allahabad, Calcutta and Bombay.
SUPERINTENDENT, AMERICAN BAPTIST MISSION PRESS, Rangoon.
MANAGER, GENERAL BOOK DEPOT, Nagpur and Jubbulpore.
THE MANAGER, "THE HITAWAD," NAGPUR.
BABU S. C. TALUQDAR, Proprietor, Students & Co., Cooch Behar.
A. M. & J. FERGUSON, Booksellers, Ceylon.

MAP SHOWING
AGRICULTURAL CONDITIONS IN CENTRAL PROVINCES & BERAR

Scale 1 Inch = 48 Miles

50 0 50 100 Miles



REFERENCES

- Province or State Boundary
- District Boundary
- Feudatory State
- Railway
- River

CROSS HATCHING IN COLOUR SHOWS SUBSIDIARY CROP.
CHIEF CROP IS SHOWN BY BACK GROUND COLOUR

- Cotton
- Wheat
- Rice
- Lesser Millets
- Government Farms
- Seed Farms and demonstration Centres
- Head Quarter Town

Printed at Office of Supdt: Govt: Printing Nagpur C.P.

No. 563 / XIII-18-23.

Central Provinces Administration.

AGRICULTURE DEPARTMEMT.

Nagpur, the 24th November 1915.

READ—

Report on the working of the Department of Agriculture, Central Provinces, for the year 1914-15.

RESOLUTION.

During the last few years the scope of the Agriculture Department's work has been limited to some extent by the inadequate strength of the superior staff. The addition, in 1913-14, of two Assistant Directors, one of whom is now in charge of a Circle as Deputy Director, has helped towards meeting the difficulty, and the formerly overburdened charge of the Southern Circle has been further relieved by forming a small Circle round Nagpur and placing it under the Principal of the Agricultural College. Operations in each of the three main and fairly well-defined tracts of the Province—the wheat, rice and cotton tracts—are now in charge of a separate Deputy Director. But there is still immense room for expansion, especially in the direction of cattle-breeding, assistance to the co-operative movement in its development on productive lines, and the utilization of the large irrigation projects now in course of construction. A larger staff is still required, and the sanction of the Secretary of State has recently been received to the employment of the minimum staff which the Chief Commissioner considers necessary, namely, three Deputy Directors with an Assistant attached to each. At present the need for financial economy prevents the full recruitment of this staff, as well as the inauguration of any large projects such as additional farms, but during the past year it has been possible to open a new farm at Betul and to start another on a small scale in Kawardha.

2. At the Agricultural College it has long been felt that a single course of training can hardly be devised so as to be suitable alike for the practical farmer of ordinary educational attainments and for the more advanced student. To meet this difficulty a new course of studies, based on the system in practice at Coimbatore, has been introduced, under which the course is divided into two parts. The first is devoted almost entirely to agriculture and is sufficiently complete in itself for the training of the lower subordinate branch of the Agricultural Service or for private farmers, while the second part consists of a more advanced course of science which will provide a training for the upper subordinate service. It is gratifying to learn that this innovation has already resulted in an increase of candidates for training. In this connection the Chief Commissioner regrets that Berar, with its well-to-do and comparatively progressive agricultural population, sends no candidates to the College. The matter is one in which the Department should seek the assistance of District and Sub-Divisional Officers, and the Chief Commissioner would commend it to the attention of the Commissioner of Berar.

3. The season was on the whole a favourable one, and some useful results were obtained on the eight Government farms by way both of research and of demonstration. At the Tharsa Farm excellent results were obtained with Raipur ground-nut followed by wheat, and it was also demonstrated that oranges are very much more economical of water than plantains—a result of considerable

importance for irrigated tracts where the supply of water is limited. The Akola Farm was devoted almost entirely to the production of Rosea cotton seed which has proved so complete a success in the Nagpur-Berar country, and only one-twentieth of the area was put under experimental cropping. The Chief Commissioner agrees with Mr. Leftwich that it would not be sound policy for Government to undertake the business of the production of seed on a large scale, as this can be better achieved by a further extension of private effort in the shape of agricultural seed unions. The successful financial results attained on this farm in the past few years by the sale of Rosea seed are undoubtedly tempting, but this must not be allowed to eclipse the more important work of carrying out experiments and demonstrating improved methods to the cultivators. Apart from cotton, there is much room for experiment in rabi crops which are of no small importance in Berar and also in juar which is the staple food in that part of the country. Sir Benjamin Robertson notes with pleasure the continued signs of the interest shown by the public in the Adhartal Farm at Jubbulpore, and now that it has been extended by the addition of 50 acres of black soil, which will render possible a great expansion in wheat experiments, the usefulness of this farm should be greatly enhanced. At Nagpur the new Research Institute has now been completed, and the work of the Agricultural Chemist and Economic Botanist will no longer be handicapped, as in the past, by want of proper accommodation and equipment.

4. The year was marked by the extensive depredations of the "Maho" insect, a small green hopper which attacks the rice-plants. Its activities were manifested principally in the Chhattisgarh Division, and the Entomological staff of the Department was almost continuously occupied in the investigation of its somewhat obscure life-history and, with the strenuous assistance of the Executive staff, in organizing campaigns for its destruction. The cultivator is slow to act on his own initiative but responds to practical example, and the campaign has done much to win still further the confidence of the most backward people of the Province in the efforts of the Department for their welfare. Nothing in the history of the Agricultural Department is more gratifying than the success of its patient efforts among the slow-moving population of Chhattisgarh.

5. The work of demonstrating to agriculturists the increased profits to be derived from the use of improved implements and methods of agriculture, and the use of properly selected seed, was carried on with unremitting energy in the various Divisions. In Chhattisgarh the areas under transplanted rice rose from 30,000 to 40,000 acres, and the fact that this area is distributed over nearly 5,000 villages shows how widespread are the activities of the Department in this respect. In fact, as is pointed out by Mr. Clouston, the work has grown so much that it is impossible for the limited staff of Agricultural Assistants to give it the amount of personal attention it deserves, and the Chief Commissioner agrees that villages in which the methods have been demonstrated for 2 or 3 successive years may be left to themselves for the coming year. A vast increase of wealth awaits Chhattisgarh when its cultivators adopt transplantation as a general practice; in addition to saving two-thirds of the seed sown under the present wasteful methods, the increase of outturn per acre is between 800 and 900 lbs., worth Rs. 21-8-0. With the excellent start that has been made it may be hoped with some confidence that ultimately, at least in the areas commanded by the Mahanadi and Tendula Canals now being built, transplantation will be almost universally followed. In the Northern Circle an outstanding feature is the success which has attended the small demonstration plots managed by Kamdars who have been trained at the Adhartal Farm. The principle that these should be increased in numbers and spread uniformly over each district appears sound, and there is no reason why they should not be supplemented, as has been done in Jubbulpore, by private unions of agriculturists who will run demonstration plots with their own ploughmen. The Evans Seed Farm working in connection with the Crosthwaite Central Bank did useful work in supplying nearly 100 tons of first class selected wheat seed to members of Co-operative Societies at a time when, owing to the failure of crops in the previous year, good seed was extremely scarce. The value of co-operation in agriculture is further illustrated from the Western Circle, where the number of agricultural unions increased to 30 and where these unions and the seed farms connected with them distributed 700 tons of Rosea cotton

seed. The formation of Taluk Agricultural Associations in Berar, in place of the more cumbersome District Associations, is likely to lead to increased interest on the part of agriculturists in the work of the Department; experience in the north of the Provinces has already shown that concentration in small areas, with definite local interests, is the best means of securing practical and tangible results.

6. Cattle-breeding was very successful at Telinkheri and Powarkhera, but less so at Chandkhuri where there was an unfortunate outbreak of foot and mouth disease. Mr. Clouston has drawn attention to the unsuitability of the Telinkheri Farm area on account of the stony nature of the ground and the poorness of the grazing, and the question has now to be considered whether it would not be advisable to move the farm to the regular breeding grounds from which the stock is mainly drawn. The important question of cattle-breeding has hitherto received somewhat unsystematised attention from Government, and the time has now arrived for framing a comprehensive scheme for the institution of farms at the most suitable breeding centres with a view to maintaining strains of the best breeds and producing new types suited to the special needs of each tract. The first step will be to ascertain the most favourable centres for each breed, and the farms will then be taken up in order of importance as funds permit. A start has already been made with a farm at Borgaon in the Akola District for the improvement of the Khamgaon breed, which is the most important class of agricultural cattle in Berar.

7. The success of the Co-operative Society of Gaolis at the Telinkheri Dairy during the past year has led to the registration of a second Gaoli Society as the result of a spontaneous request on the part of its members, so that it would appear that the Nagpur Gaolis are at last beginning to appreciate the benefits of co-operation. It is satisfactory to learn that they give the farm staff very much less trouble than formerly, and it is almost possible to hope that the example they are now setting may lead to the reform of the milk-selling class and the solution of the question of the milk-supply of a large city. In the meantime the dairy has been a boon to the residents of Nagpur and has added largely to the amenities of life, and the early forebodings as to its success have been dispelled.

8. Mr. Leftwich as Director has been quick in getting into touch with the needs and activities of the Department to which he has recently been appointed, and has submitted an interesting review of the year's operations. The report contains a generous appreciation of the debt that the Department owes to Mr. Low, who has now left the Provinces, and in this appreciation the Chief Commissioner most heartily agrees. To the officers of the Department whose names are mentioned in the report the thanks of the Administration are also due. Messrs. Clouston and Evans, Deputy Directors, have continued to perform invaluable services to the agriculturists of the Province, and Mr. Allan, as Principal of the Agricultural College, has carried through an important educational reform which should have far-reaching results in the future.

ORDER.—Ordered that a copy of this Resolution, together with the enclosure, be submitted to the Government of India in the Revenue and Agriculture Department; that copies be forwarded to the Director of Agriculture and Industries and to all Commissioners and Deputy Commissioners, Central Provinces, for information and guidance; and that it be published in the Supplement to the *Central Provinces Gazette*.

J. HULLAH,

Third Secretary to the Chief Commissioner,

Central Provinces.

Govt. Press, Nagpur:—No. 1788, Civil Sectt.—25-11-15—602.

Report on the working of the Department of Agriculture, Central Provinces, for the year 1914-15.

Mr. Low held charge of the office of the Director of Agriculture and Industries, up to the 30th November 1914, when he proceeded on four weeks' privilege leave. On the expiry of his leave his services were placed at the disposal of the Government of India in the Department of Commerce and Industry. I have held charge from the forenoon of the 1st December 1914.

Messrs. Ley and Gibson, Assistant Commissioners, were placed on special duty in this Department to relieve the Director of part of the responsible work. The former remained from 31st August 1914 to 16th November 1914 and the latter from the 15th September 1914 to the 23rd March 1915.

2. From 1st January 1915 the districts of the Central Provinces and Berar were re-distributed into four Circles. The Berar Division with the Wardha District, the Warora Tahsil of the Chanda District, the Nimar District and Sausar Tahsil of the Chhindwara District was formed into a new Circle to be known as the Western Circle with head-quarters at Nagpur. The Nagpur District, excluding the Ramtek Tahsil and the Government Farm at Telinkheri (Nagpur), formed the new College Circle under the Principal of the Agricultural College, Nagpur.

3. Mr. Ritchie continued to hold charge of the Northern Circle up to 26th October 1914 when he was relieved by Mr. Evans on his return from six months' combined leave. Mr. Ritchie was placed on special duty at Nagpur till the 1st January 1915 when he was appointed Deputy Director of Agriculture in charge of the Western Circle.

4. Mr Clouston continued in charge of the Southern Circle throughout the year.

5. Mr. Plymen, Agricultural Chemist, continued in charge of the Agricultural College in addition to his own duties till the forenoon of the 14th September 1914 when Mr. Allan relieved him, having been recalled from leave owing to the war.

6. The remaining vacancy in the superior expert staff of the Department has been filled up by the appointment of Mr. Harvey as Assistant Director of Agriculture. He joined on the 3rd November 1914 and was attached to the Southern Circle till the 18th February 1915 when he was transferred temporarily to the Northern Circle.

7. Mr. Plymen, Agricultural Chemist, proceeded on seven months' combined leave with effect from the 17th April 1915 and Mr. Padmanabha Iyer, Assistant to the Agricultural Chemist, held charge of the current duties of the office in addition to his own duties.

8. Mr. Hiralal Shrivastava, Extra-Assistant Director of Agriculture, was reverted to the grade of Agricultural Assistant from the 1st July 1914. Rai Sahib Tundilal Powar proceeded on seven weeks' privilege leave from the 10th April 1915. Rai Sahibs Tundilal and Bhayyalal and Mr. Nandkishore continued in charge of the demonstration work in the Chhattisgarh, Berar and Nerbudda Divisions respectively throughout the year under report, with the exception of the short period during which Rai Sahib Tundilal was on leave. No one has yet been appointed to the charge of demonstration work in the Wainganga Division in place of Mr. Hiralal Shrivastava. The head-quarters of Mr. Nandkishore were transferred during the year from Hoshangabad to Jubbulpore.

9. The total expenditure of the Department during the year under report was Rs. 4,07,843 against Rs. 4,43,000 of the last year.

10. While Mr. Low was in charge of the Department he visited the Adhartal (Jubbulpore) and Labhandih (Raipur) Farms, the Nawagaon Cattle-breeding Society, Chandkuri Cattle-breeding Farm, Amraoti and Buldana. He made a round tour in the Drug and Raipur Districts. I visited the Sindewahi (Chanda), Adhartal (Jubbulpore), Powarkheda (Hoshangabad) and Labhandih (Raipur) Farms, Betul, Chhindwara and Seoni. I toured in the Chanda District and also visited the Sewage Farm at Madras, the Agricultural College at Coimbatore, and the Mysore Government Experimental Farm at Bangalore.

PART II.—AGRICULTURAL EDUCATION.

General.

11. The work of the year suffered considerably from a serious outbreak of plague which necessitated closure of the College for seven weeks, at an important stage of the course for each year, from the 15th January to the 6th March. This break in the curriculum had an adverse effect on the studies in every branch. Mr. R. G. Allan, the Principal, was on leave for the first 2½ months of the year, which began on the 1st July 1914. As explained by my predecessor last year, much of the special teaching in Botany and Chemistry was necessarily carried on by Indian assistants, and the results achieved in spite of adverse circumstances were creditable. Mr. Allan holds the view, with which I agree, that it is very necessary for the expert heads of sections to give general supervision to the work of their assistants and to give occasional lectures themselves on selected subjects.

New entries.

12. There were 30 new pupils entered for the first year: of these, 6 fell out during the year and 24 appeared for examination, 12 of these being the sons of agriculturists and 7 of Government servants. No less than 14 of the 30 came from the Northern Circle, 4 from Central India and 3 from outside the provinces, while none came from Berar. Mr. Evans has given much personal interest to the selection of candidates and has been greatly helped by the Head Master of the Hoshangabad High School. Mr. Ritchie is giving the matter his attention and some good entries from the Western Circle may now be expected. The Southern Circle has less promising material for recruitment, but still continues to send some quite good candidates.

The Principal has begun to attend Divisional Agricultural Conferences and will soon get personally well known to leading agriculturists throughout the combined provinces.

The Curriculum.

13. My predecessor indicated in last year's report how the course of studies at our College was still capable of improvement, in particular with a view to differentiating between two classes of men required by the department to be produced at the College. Mr. Low had intended to visit Coimbatore College after Mr. Allan's return from leave, but his appointment to the Government of India Secretariat prevented this. I went myself, therefore, with Mr. Allan in February 1915, and we were most kindly entertained by Mr. Wood, the Principal of the Coimbatore Agricultural College, and his staff. Before our visit Mr. Allan had carefully explained to me the history of the different systems of Agricultural teaching at the various Colleges in India, particularly our own, and set before me the advantages and defects of each most impartially. As a result of our visit and discussions at Coimbatore we have obtained the approval of the Local Administration to a complete change of curriculum. In future, that is from the 1st July 1915, the course will be divided into two parts: the first part will be of two years during which agriculture, practical and theoretical, will be taught, with only so much allied science as would be necessary to enable the students to grasp fully the meaning of the theory and practice of agriculture. Ordinarily only Matriculates will be admitted to the course, but exceptions will be made in special cases. At the end of two years the students will be examined

and those who pass will obtain a diploma in Agriculture which will entitle them to obtain Government service in the lower grade of Agricultural Assistants. Such men will be also well qualified to manage their own or others' farms and will be eligible for service in the Settlements and Land Records Departments and under the Court of Wards. Those who pass this examination in the first division will be eligible, if they like, to continue their studies and take a higher course of science. This course will be of a year and a half and those who pass the examination at its end will be eligible for the degree of L. Ag. They will also be qualified for employment under Government in the upper grades of Agricultural Assistants, from which every man who gives satisfaction may expect to rise to provincial rank as Extra Assistant Director, and perhaps later even as Extra Deputy Director, though this grade has not yet been created. The separate farmer's course will no longer be necessary, nor could the Principal find time to devote to it, his duties already being multifarious.

The College Circle.

14. As reported in paragraph 2 above a College Demonstration Circle has been created from the 1st January 1915. This will serve to keep the Principal in closer touch with the actual conditions of agriculture in the Provinces as well as providing him and his students with opportunities of getting away at times from the routine of the class-rooms, laboratories and the College farm. Since the close of the year it has been decided to add the Sausar Tahsil of Chhindwara District to this Circle, it being readily accessible by road or rail from Nagpur. This accretion will add to the variety and interest of the Circle.

The Hostel.

15. The Hostel has again been very well managed by Mr. K. P. Shrivastava, Assistant Botanist, who has been promoted to Provincial rank. It is a pleasant building, but will almost immediately require considerable extension by a new quadrangle to contain new refectories and additional dormitories. This is due to the increasing popularity of the College. Already the new prospectus drawn up in consequence of the revised curriculum is attracting many more candidates than formerly.

PART III.—RESEARCH AND EXPERIMENT.

(a) *Agricultural.*

Nagpur Farm.

16. The season was favourable on the whole for kharif crops and late-sown wheat. Early-sown wheat suffered somewhat from unusually warm weather in October. The experimental series were in continuation of those of last year. Satisfactory if not surprising results were recorded. Some of the tillage experiments will be continued further. The value of urine-earth as a manure seems to be established beyond question, and the beneficial and remunerative effects of underdrains have been demonstrated beyond all expectation. The experiment is being extended to further land, typical of the fields on which the big sewage farm will be laid out. Mr. Allan has come to the conclusion that soybean will not prove very lucrative if sown on the black soils of these Provinces. The experimental dairy farm has continued to do extremely well. It constitutes an excellent model in cleanliness and in the purity of its products, and has roused a good deal of interest in the educated Indian community of Craddock Town. It is difficult to give its financial results because the value of the great amount of personal care given to its supervision by Mr. Allan is uncertain and almost impossible to estimate. But it seems clear that, if run on a sufficiently large scale, a thoroughly sanitary dairy on the most modern lines could be made to pay fair profits, provided the proprietor be prepared to give it his undivided attention.

Tharsa Farm.

17. This comparatively modern farm has now been got into very good order and the experiments being carried on give promise of important results. It has apparently demonstrated already that rice will not do on morand soil, ever clay at any rate. This is an important fact when the possibilities of extending irrigation to new soils

affect the financial prospects of new irrigation projects. There was some question of the retention of the farm on its present site, but this has been definitely settled in its favour after the close of the year. Some of the cane experiments may almost be said to have reached finality though most of them require continuance. It is interesting to note that Pusa 12 wheat grown under irrigation was after Sukarhai Pissi the most paying of 18 wheats under trial. Raipur ground-nut followed by wheat has again shown excellent profit. The fruit farm promises well. Mr. Clouston finds that oranges are far more economical than plantains in the consumption of water and we hope to demonstrate that they are more lucrative. This will have important results if we are able to get the considerable areas of land under plantains in the command of the Ramtek Tank converted to the culture of oranges, economy in water being of prime importance in the present state of the tank.

Sindewahi Farm.

18. This farm also has been brought into very good condition, little terracing and levelling still remaining to be done. The grazing questions have been settled to the satisfaction of the villagers, and a proposal has been made for the sanction of the Administration to acquire a small neighbouring tank and the fields irrigated from it, known as Bhuikund. The object of this is to improve the catchment area and provide more land for cane cultivation under the Garmusi Tank. Last year shortage of water in the tank caused our own cane area to shrink to 10 acres. This year it has been possible to extend it to 30 acres. The climate is unfortunately very trying and the Local Administration has sanctioned the provision of special safeguards against malaria. Important experiments were carried on with numerous varieties of sugar-cane and instructive results obtained. Useful experiments with cotton and rice were continued.

Raipur Farm.

19. The principal object of the Labhandih farm close to Raipur is the improvement of the rice crops in Chhattisgarh. It is favourably situated in about the centre of this backward Division. One of the first ways in which the object is attainable is by the substitution of transplanting for the local broadcasting method of rice cultivation. The progress made in this substitution will be dealt with under the head of Demonstration. Though the superiority of the former was again established at this farm, it can hardly be called experimental; this process has long passed the experimental stage. Another desideratum is the eradication of wild rices which, as Mr. Clouston reports, "pollute the paddy of every village." But this also is a matter for demonstration, not experiment. Manurial experiments with rice, irrigated and unirrigated, were continued, and valuable results were obtained in experiments to find the optimum quantity of water for irrigating rice whether transplanted or broadcast. Spacing experiments were continued, and transplantation by single seedlings was proved to be the most profitable method in a period of experiment extending over four years. Other useful experiments were carried out with rice, wheat and ground-nuts. Some new varieties of rice provided by the Economic Botanist were tested with very promising results.

Telinkheri Seed Farm.

20. The so-called Telinkheri Seed Farm has now practically passed, as Mr. Clouston reports, into a fodder farm for the growth of irrigated juar, clover, san hemp and maize, in order to meet the requirements of the Dairy and cattle-breeding herds. At the same time Mr. Clouston continued some useful tests in the ginning percentage of various strains of *roseum* and of the superior stapled Deshi Lahore crossed Bani.

Adhartal Farm.

21. Some 50 acres of black wheat land was acquired at Kheri, about 2 miles from the Adhartal Farm at Jubbulpore, as an adjunct to that farm, in order to conduct experiments in wheat cultivation and to test new varieties under conditions typical of the Jubbulpore Haveli wheat area; but most of the year was taken up in getting this land into good condition and no conclusive experiments could be carried out. The Adhartal Farm proper consists mostly of light and sandy loams incapable of growing wheat without irrigation. Its fields are commanded by the Jubbulpore

Irrigation Tank and the object of the farm was largely to experiment in, and subsequently to demonstrate, the economical use of the tank water and the methods of cropping and cultivation best suited to the areas commanded by small irrigation tanks in the district. Already good progress has been made and has excited much interest in the better class of cultivators in the neighbourhood. Work of levelling, draining and embanking rice land in the farm area was continued, and already the farm presents a very creditable appearance, though much still remains to be done to complete its preparation for more experiments. The season was good for Kharif crops, but bad for Rabi. The numerous experiments for rice were continued, including tests of the additional profits to be obtained by transplantation and of the value of green manure. and trials of varieties; finally a most interesting experiment was made in rice sown with a drill—a method said to be followed in the Southern States of America with good results. So far, conclusive results have not been obtained, primarily because a thoroughly satisfactory seed-drill has not yet been secured. A number of useful experiments were continued or begun with numerous varieties of sugarcane. It is interesting to hear that *khari* stands first of the thin varieties on account of its high yield and general hardiness, the *gur* being of fair quality though not of the first class. This is presumably the same Bengal cane which has been found by Mr. Clouston at Sindewahi to be particularly immune from red rot. Mr. Clouston further records that "this variety also tillers extremely well, and as a ratooner is second to none." Considering how widely different the climatic conditions are at Adhartal and at Sindewahi, good reports from these two farms upon this particular variety of sugar-cane seem to indicate its suitability for introduction in all tracts of the Central Provinces where a thin variety is recommended. Small attention was given to wheat which can only be grown on the light soils of the farm with irrigation; but a good start was made in testing varieties at the new Kheri annex. Mr. Evans also initiated numerous other experiments with ground-nut, gram, Sann hemp, sweet potatoes, chillies, and other garden crops as well as some experiments on grass land; and already this farm may be ranked high amongst the experimental farms of the country. Its interest for the general public is shown by the fact that there were 576 visits of non-officials to the farm during the year, exclusive of those who attended the show. The short practical courses for Kharif and Rabi crops were attended by 17 students, 15 of whom were from the districts of Jubbulpore and Narsinghpur. Eleven of these were sent by malguzars or the Court of Wards for training. The passed students form a useful addition to our staff of practical demonstrators out in the villages.

Powarkhera Farm.

22. This is one of the older farms and therefore less remains to be done in its improvement, but clearing of the grass reserve of stumps and stones was continued, enabling 55 acres to be cut by a mowing machine. It gave a supply of first class hay at a time when hand labour is particularly difficult and costly to obtain. Deep-rooted grasses have been nearly eradicated by the use of the Monsoon plough, and a start was made with fruit culture in an area under the big well. The rainfall was badly distributed with the result that a normal Kharif crop and a 75 A. N. Rabi crop were obtained. Manurial and rotation experiments with wheat were continued. For some reasons, which Mr. Evans has not explained, the superiority in the outturn of Kharif crops sown by a drill over the same crops sown broadcast, which was particularly noticed in last year's report, does not seem to have been maintained. The result, however, is not of any great significance as the farm is essentially a rabi one. Useful tests of new varieties were continued. *Rosea* cotton, which does so remarkably well in the Nagpur and Berar country, gave poor results in comparison with the early ripening varieties of Saugor *jari*, while Malvensis failed almost completely. Here, as in Jubbulpore, the pure lines of *tur* B-021 gave excellent results. It ripens early and so is able to escape the damage caused to later varieties by frost. It has been named by the cultivators *Aghanow*. The Pusa wheats were disappointing, and Pusa 12 in particular failed to maintain here the reputation it has acquired in other parts. The climate, however, was unfavourable, and it will be given a further more extended trial. Twelve students came to the farm for practical training, and nine of them continued their course to the end of the

year. The passed students never have difficulty in obtaining employment, and few only go back to work on their own land.

Akola Farm.

23. Out of the total area of 271 acres, only 14 acres were put under experimental cropping, while 215 acres were devoted entirely to the cultivation of No. 1 Rosea cotton. Thus the character of the farm has been almost entirely changed from an experimental to a seed farm. Even in the area under experiment, a great deal has been a repetition of experiments continued in previous years, much of it having passed beyond the experimental stage; and I imagine a considerable number of these experiments will be stopped on that account in future years. Thus the topping of cotton plants with a view to increasing the productivity may be definitely given up. It has been demonstrated quite clearly that this practice is not only expensive but unproductive. Similarly it would seem unnecessary to repeat experiments in spacing cotton plants at wide distances, it being necessary only to ascertain definitely the best spacing at lesser distances. It would appear probable that planting in rows 15" apart with the same space between plants will give the best results. In the series devoted to testing varieties, not a single new variety seems to have been under experiment, while it seems safe to reject, for the heavy black soils of Berar, the varieties Malvensis, Buri, Berar Jari, Saugor Jari and Bani. It seems to me that more might be done in testing particular strains of *rosea*. Thus 7 strains of this variety were under trial in the Telinkheri Farm. In his report on that farm Mr. Clouston remarks "it has been conclusively proved that, from an economic point of view, there is very much more scope for improving our cottons by increasing the outturn than by producing a cotton with finer lint." That may be so, but it does not seem to me that it is sufficient reason for shutting down all experiments in the direction of improving the lint as well as the outturn on such a farm as that at Akola, which was started with the object of improving the cotton crops of the Central Provinces and Berar. *Buri* for instance gives quite a fair outturn already, and fetches a much higher price per pound of lint than does *roseum*. I think we ought certainly to work strenuously on *buri* with the view of improving its outturn and at the same time carry on experiments in cross breeds with the help and advice of the Economic Botanist. Again, in the experimental area of this farm less than an acre was devoted to wheat and no area at all to any other *rabi* crops. Considering the very large areas of wheat and other *rabi* crops in the Western Circle, it would appear reasonable to expect to find more experiments going on in these crops. Mr. Ritchie has told me how anxious he is to do something in this direction, and I have no doubt that next year some new series of experiments will be put in hand. Splendid work has been done at the Akola Farm in the past, but it would not be sound to sit down now with folded hands admiring what has already been achieved. Useful results were recorded in tillage, spacing, manurial values and the selection of seed. Experiment seems to show that it is hardly worth while sowing gram between rows of cotton for the purpose of renovating the soil, and also that, at any rate in a year like the present, it is extremely paying to sow cotton before the actual burst of the monsoon, when once the first showers have made it possible to do so. The year was, of course, unfavourable to the financial results, the price of cotton being so much reduced by the outbreak of war. At the same time the expenditure increased to Rs. 13,524, a particularly heavy item being the cost of variable labour. I am extremely doubtful about the policy of Government undertaking the business of the production of seed on a large scale. It can only be made a financial success if the Deputy Director and his subordinates devote an altogether disproportionate amount of their time to its supervision, to the detriment of their experimental and other work. The Government Farm Overseer has not the same stake in his results as a private farmer. He will naturally be disposed to be indulgent to casual labourers, who will then come readily to work on his farm, knowing they will have a fairly easy time.

(b) *Economic Botanist.*

24. The year was one of great importance for the Economic Botanist, who was enabled to transfer his research work to the commodious wing set aside for him in the new Agricultural Research Institute. It is probable that even yet his equipment is not complete, and he will require the provision of separate granaries. A new building is hardly suited to the storage of such bulky crops, for instance, as juar, which moreover is apt to encourage the settlement of rats within the building; and this is obviously to be discouraged.

25. Mr. Graham continued investigation of the rice, juari and wheat crops of the Province. The testing of selected lines of rice made some progress. Pure line cultures were maintained at Nagpur, and 30 early ripening varieties were tested at the Adhartal Farm, Jubbulpore. The wild rices of the Central Provinces were brought under systematic study, over 100 different specimens having been collected and grown under observation at Nagpur. Some of the technical difficulties involved in the study of the natural crossing of juar were overcome, and Mr. Graham hopes to be able to make some progress with the classification of this crop, which, up to the present, has defied all attempts at scientific classification. Promising experiments in the crossing of wheats were carried on with a view to the production of a strain resistant to rust but possessing the good qualities of New South Wales varieties. Mr. K. P. Shrivastava, Assistant Economic Botanist, completed the classification of all varieties of Capsicums grown in the Central Provinces. All the selected seed that could be produced was taken up, and many orders had to be refused. Mr. Graham has pointed out the occurrence of a misunderstanding in regard to the early ripening round chilly, which is suitable for cultivation where there are no facilities for irrigation. Where such facilities exist, it is ordinarily more profitable to grow one of the later varieties. Useful experiments were carried on in regard to *sann* hemp, water-melons and cotton. The last was with the view to isolating an early ripening cotton staple for the lands of the Northern Circle.

26. A small experimental fruit garden on the waste land lying to the south-west of the Victoria Technical Institute was started by the Economic Botanist, who will devote particular attention to the culture of oranges. A series of experiments was started with the view to determining the cheapest form of manure for orange trees, while stock experiments and the testing of varieties were also taken in hand.

27. It was unfortunate that, owing to the absence of Mr. A. E. Lowrie on military service, no practical start could be made with the experimental co-operative market garden at Chhindwara. Before any such measure can be pushed forward, it is essential that Government should demonstrate the practical value of improved market gardening to the local *kachhis* of Chhindwara, and to do this we require the local supervision of Mr. Lowrie.

(c) *Agricultural Chemist.*

28. The year was important to the Agricultural Chemist also from the fact that he was enabled to take up the wing assigned to him in the new Agricultural Research Laboratory from the middle of April. Besides helping in the teaching of science to students in the Agricultural College, Mr. Plymen assisted in conducting examinations at the Agricultural Colleges of Sabour and Coimbatore. During the year he also visited all the Experimental Farms in connection with the analyses of soils and of sugarcane extracts. The interest of the cultivating public in this branch of agricultural advance is steadily increasing. Out of the 75 analyses carried out during the year, thirty were of samples received from cultivators. A long series of analyses to determine the chemical and physical characteristics of the fat of buffalo milk, and the changes produced therein by variations in climate and feeding, were completed, and similar investigations were continued regarding the milk and butter of ordinary cows. Investigations were continued to determine the nitrogen contents of some varieties of paddy. The old laboratory gave little scope for this series of analyses which will now be taken up in earnest in the new building.

(d) *Entomology.*

29. The Assistant Entomologist, Mr. Ratiram Khamparia, was on leave for the greater part of the year, his place being taken by Mr. G. D. Ojha whose services were kindly lent by the Imperial Entomologist. He did useful work, investigating damage done by cane borers in the Chanda District. His simple remedy of uprooting and destroying affected shoots was tried and found effective both there, and in Balaghat. After the end of April he was almost continuously employed till the end of the year investigating the Maho pest of rice in Chhattisgarh and organizing campaigns against the same. Mr. Ojha and Mr. Misra, who had been deputed from Pusa for this purpose, devoted much time to endeavours to find out how and where the Maho insect hibernates, but without success. Fortunately this pest has been almost completely wiped out by heavy rains at the end of August and in September.

(e) *Sericulture.*

30. No sericultural operations were undertaken during the year.

(f) *Cattle Breeding and Dairy Farms.*

Telinkheri Farm.

31. The Telinkheri Breeding Farm proper had a very successful year, having been particularly immune from disease. There was no disease in epidemic form, and there is some doubt how far the unfortunate losses incurred in 1913 were due to any form of tick fever. Mr. Clouston has never believed much in this theory, and I find that the Veterinary Experts differ in their diagnosis. In the current year's report Mr. Clouston has noticed the extraordinary poorness of the grazing in the farm area and recorded how the cattle "as usual got run down in condition at the beginning of the hot weather." Apparently the herd was thus run down in condition in April 1913, when rinderpest in epidemic form was raging in the neighbourhood, and unfortunately got a footing in the herd which was not well prepared to combat the disease. Before proceeding on leave Major Dawson informed me that the Acting Deputy Director had worked extremely hard to remedy defects and stamp out disease. The site of this farm is not at all favourable for breeding on account of the very stony nature of the ground and the extremely poor grazing to be had from it. I believe the leading breeders at home differ in their opinion as to the effects on the progeny of environment during gestation, but it is evident that a breed of cattle specially bred by Government for sale to the public in order to improve the general class of cattle in any locality must present an attractive appearance, and I am afraid it is not possible to achieve this at Telinkheri. When the site was originally chosen, the staff available for supervising cattle breeding operations was very limited, and naturally all operations tended to become centred in Nagpur. The time has now probably come to move this herd to more suitable environments. The breeding grounds from which the herd has been built up are to be found, I understand, in Arvi and Sausar Tahsils. What little grazing is to be had on the Telinkheri area would be most acceptable for the dairy herd or might even be let out to grazing on payment of fees to the co-operative Gaolies. The gaolao-herd increased from 147 to 149, and the annual statement of account shows a net profit of about Rs. 50. The average price of bulls sold was slightly lower than in the previous year due undoubtedly to the influence of the war on prices. The statement of receipts includes the value of manure, feed and fodder still in stock at the end of the year, without taking into account their value at the beginning of the year. It also includes the increased value of stock. Excluding these items there was an actual monetary loss of Rs. 1,054.

Dairy Farm.

32. The Government herd consists of 122 animals. The observations of this farm go to show that the introduction of a strain of Delhi buffalo blood amongst the Central Provinces milch buffaloes is profitable and should be followed in all dairies run on a large scale. The average percentage of butter fat fell from 4·7 to 4·2 for ordinary cows and rose from 7·3 to 8·1 for buffaloes. The Dairy Breeding Farm showed a net profit of roughly Rs. 400, but the cost of establishment was unnecessarily high, half of the employees' time being taken up in the supervision of privately owned herds.

Gaolis' Co-operative Societies.

33. Thanks to the constant careful supervision and intervention of Mr. Clouston, the original society of 13 members has had a most satisfactory year. They made a profit of over Rs. 306 per member and Rs. 42 for each milch animal. Their sales of milk increased by 50 per cent, while their sales of butter and cream were multiplied many times over. The dairy had 303 customers for milk and 65 for butter during the cold season. The advantages accruing to the members are many. They have an assured and constant market for all their produce. They get concentrated foods at wholesale prices with the minimum of trouble to themselves. Mortality among their animals is greatly reduced owing to the improved conditions insisted upon by a Government supervisor. Probably their chief benefit has been the keen personal interest taken in the welfare of the society by Mr. Clouston, to whom the thanks of the residents of Nagpur are also due for having secured them a supply of pure milk, fresh butter and rich cream at moderate rates. That all the benefits of this kind of co-operation have been realised by the Gaolis has been proved by the formation of a second co-operative society on the same lines.

Chandkhuri Farm.

34. This farm was only opened two years ago. The herd numbered 111 at the start of the year; 26 calves were born and 8 cows and 1 bull were bought. Five animals were sold and 3 died, leaving a herd of 137. No young bulls were yet ready for sale, and the animals sold were only such as were not up to the standard desired for the propagation of the herd. There was an unfortunate epidemic of foot and mouth disease in the herd during the year.

Nawagaon and Khandwa Co-operative Breeding Farms.

35. For some years certain areas had been set aside by Government as fodder and fuel reserves in different parts of Chhattisgarh. Some of these, including Nawagaon and Khandwa, were found not to be effecting what they had been set aside for. The grass of both areas is mostly spear grass and the hay was not being taken up by cultivators. The Nawagaon and Khandwa Co-operative Societies were formed in order to make use of these areas for supplying grazing and raising fodder crops on the same lines as those followed by the Government cattle breeding farm on the Chandkhuri reserve. They have been given leases of the reserves on favourable terms and have been carefully fostered by the Department. The Nawagaon Society consists of 22 members. The paid up share capital is Rs. 1,020. The profits for the year amounted to Rs. 351-4-0. During the current year much of the young stock will become ready for sale and the profits should increase accordingly. At the end of the year the herd consisted of 1 bull, 60 cows and 31 calves. The Khandwa Society consists of 12 members with a share capital of Rs. 1,100. The year's profit amounted to nearly Rs. 700, of which Rs. 544 was spent in putting up a corrugated iron shed and huts for the staff.

36. There are several other private cattle-breeding farms in Chhattisgarh, but with one exception they have rather inferior stud bulls. When good bulls from the Government and Co-operative Breeding Farms are ready for sale, they will be sold first, if wanted, to the existing private breeders.

37. Mr. Clouston has done much good work in popularising the use for concentrated cattle feeds, as well as for manure, of the oilcake bye-products of the oil-pressing ventures started by private enterprise in these Provinces.

Sheep-breeding.

38. The breeding flock was transferred during the year from Sindewahi, where the animals had died freely in the excessively wet season, to the drier climate of Telinkheri; but here they were attacked with liver fluke and certain other obscure diseases which are being studied by the Veterinary Department. The flock was, therefore, again moved on to Tharsa. A Merino strain has been introduced with a view to improving the fleece. In co-operation with the Textile Expert an effort will be made to start a home-spun woollen cloth industry.

Powarkhera Farm.

39. The herd of pure Malvi breed was increased by the birth of 18 calves, but 22 head were sold, leaving 76 at the end of the year. Only 23 of these are calves and 14 heifers. Mr. Evans has included all bulls under one head, and so it is not possible to say how many of the 24 so classed are immature young stock, and how many have been left on hand though ready for sale. The farm shows a net loss of Rs. 850, but this is mostly due to the fact that the price of one bull sold for Rs. 150 had not been recovered till after the close of the year, and also to the storage of a large quantity of cheap cotton seed, most of which was on hand at the end of the year. Not a single animal was lost from disease or accident,-a most satisfactory accomplishment.

Borgaon Farm.

40. A new breeding farm has been opened for improvement of the Khamgaon breed in Berar on the Borgaon reserve in Akola taluk. It is 4 miles from the Borgaon Station which is 10 miles by rail from Akola. The land is well drained, sloping to a small nullah running through its middle. The low lying area on either side of the nullah will provide excellent green fodder till late in the cold weather. About 80 acres of the farm is of good black soil which will be brought under cultivation. The principal grass is Paona which is regarded as the best fodder grass in Berar. A complete set of suitable buildings has been provided, and on the 30th of June a herd had been got together consisting of one bull, 40 cows and 1 heifer, 8 bull calves and 13 cow calves. Fencing of the whole area has been nearly completed under departmental supervision. The expenditure for the year including buildings, fencing, purchase of stock, feed and care of cattle, servants, coolies and miscellaneous amounted to Rs. 9,746. Already this farm has excited considerable interest among the cultivators of the locality. In time when the staff is available for its management and supervision, another farm will be required to preserve and improve the Umardha breed, which is the breed of next importance in Berar.

PART IV.—DEMONSTRATION.

Chhattisgarh Division.

41. The principal improvement demonstrated in this Division continued to be the transplantation of rice. The District Staff continued to be responsible for the quantity, and the Department of Agriculture for the quality of work done. The area transplanted rose from 30,000 acres to just short of 40,000 acres spread over 4,760 villages. Of this increase, nearly 6,000 acres was added in the district of Bilaspur, where the total rose to 15,609 acres. Mr. Clouston remarks that the work has grown so much that it is impossible for the limited staff of Agricultural Assistants to give it the amount of personal attention it deserves. But it would probably be safe to leave to themselves for the coming year those villages in which the methods have been demonstrated for 2 or 3 succeeding years. The increase in the year would have been considerably greater but for the feeble start of the monsoon, the village tanks being slow to fill. Crop experiments, to compare the outturns of *biasi* with transplanted rice, were carried out in 90 villages, 5 leading men of each village testifying to the accuracy of the figures in each case. The average yields gave an increased outturn due to transplantation of 869 lbs., worth Rs. 21-8-0 per acre. Apart from this, transplantation gives a greater outturn of straw, it requires less than $\frac{1}{3}$ of the quantity of the seed used for *biasi*, and it will quickly lead to the elimination of *karga* (wild rice), which pollutes broadcasted rice crops to the extent of as much as 50 per cent in some cases. To keep the rice seed of seed-beds meant for transplantation pure and free from *karga*, farms for the distribution of selected rice seeds have been started. The whole rice area of the Labhandi Farm is now sown with selected strains of the more promising varieties, and last year selected seed of No. 19 Gurmatia paddy was supplied to the private seed farms at Amdi and Khandwa: excellent yields were obtained, and 50,700 lbs. of pure seed have been distributed by them this year to cultivators. Eight more rice-seed centres have been formed during the year. The advantages of irrigating wheat are no longer demonstrated by the Department, but two experiments were made to compare the outturns of irrigated and unirrigated wheat.

The increase in yield due to irrigation was found to be 400 lbs. in one case and 480 lbs in the other. The cultivation of groundnut in Chhattisgarh is growing steadily in popularity owing to the demonstrations of the Agricultural Department. The usual personally conducted tour of cultivators from Chhattisgarh to Bhandara and Balaghat was again carried out with satisfactory results. Lack of water in the Government tanks prevented any advance of cane cultivation, and it is best to see how the big works of the Mahanadi and Tendula Canals will behave before the Department undertakes extensive demonstrations in this crop.

42. Another very important branch of work undertaken by the Department during the year was combating the damage done to rice in some parts of the Division by an insect pest locally known as 'Maho' which has been identified by the Imperial Entomologist as Nephotettix bipunctatus. The departmental staff was largely occupied demonstrating the use of light traps to destroy the adult insect, and the way to 'bag' the insect in the early stages of an outbreak. Enough is not yet known of the habits of this pest to enable the Department to demonstrate preventive measures by improved tillage. Tahsil Agricultural Associations were started during the year in the head-quarter tahsils of Raipur, Bilaspur and Drug.

Nagpur Division.

43. The chief improvements in the Nagpur Division were the introduction of *gurmatia* rice which has done extremely well wherever it has been tried, and the substitution of the single seedling method of transplanting rice for the method of sowing in bunches commonly practised in Bhandara and Chanda. The latter method requires from 100 to 125 lbs. of seed per acre while the single seeding rate works out at only 25 lbs. In the district of Chanda 4,750 acres of rice were transplanted with single seedlings under the supervision of the Agricultural staff, while 30,000 lbs. of *gurmatia* seed were supplied from the Sindewahi Farm to the cultivators in this district. *Sannabille* cane, which is now recommended by the Department for the Chanda District, as giving a good yield and suffering very little from red rot, has already become very popular and is fast replacing *katai*, the thin variety previously known in the district. The introduction of *til* and castor cake as a manure for cane, of patent protective fencing against pig, of Nahan Cane Mills and of Poona furnaces for *gur*-making continued to make progress under our demonstration staff. In Nagpur 140 acres of rice were transplanted with single seedlings and two seed farms for the propagation of *gurmatia* rice have been started. The area under Raipur ground-nut is slowly increasing. Ten seed farms for the propagation of selected *gurmatia* rice have been opened in the Bhandara District where also 200 acres of rice were transplanted under the supervision of the Department and 1,760 lbs. of *gurmatia* rice were supplied to cultivators. Already some of the leading cultivators in the area commanded by the Ramtek Tank are taking interest in the Department's experiment with orange and mango trees on the Tharsa Farm. The next step will be to demonstrate the advantage of these fruit trees in comparison with bananas in the Ramtek area, the latter being so very much more extravagant with irrigation water.

Demonstration in the Northern Circle.

44. The circle has been divided during the year into two tracts, each under an Assistant to the Deputy Director. The 4 Satpura districts were allotted to Mr. R. I. Harvey, Assistant Director, and the Hoshangabad, Narsinghpur and the Jubbulpore Districts to Mr. Nandkishore, Extra-Assistant Director of Agriculture. Saugor and Damoh will have to be added to the latter's charge during the current year. The small demonstration plots managed by Kamdars have had a phenomenal success in the Jubbulpore District where the general opinion is now held that there should be such plots instituted throughout at distances of not more than 10 to 15 miles apart. Obviously Government could not undertake to staff so many and Mr. Evans has been most successful in getting private Unions formed to run demonstration plots under their own trained ploughmen. Five such Unions have been organized in the Jubbulpore District and 2 in Narsinghpur. Twelve demonstration farms were at work during the year. They are practically self-supporting and have effected the rapid introduction of improved implements and seeds and

of better methods of cultivation in the villages in their immediate neighbourhood. Sixty-nine wheat seed farms were inspected during the year and certificates of purity awarded to 25; many of the others obtained their certificates in the current year. In the Jubbulpore District alone the "Evans' seed supply" which is connected with the Crosthwaite Central Bank issued as much as 2,656 maunds, just short of 100 tons, of first class selected seed to members of Co-operative Societies. Eleven private cattle-breeding farms were supervised by the Department, but Mr. Evans has recorded his opinion that probably the best line on which to develop cattle-breeding in future is to start Government cattle-breeding farms in recognized breeding areas, and this is the policy which has been already laid down by the Local Administration in a recent communication. Thirty-four vernacular leaflets on particular seeds, manures and implements were prepared, bound up in book form and supplied to Jamadars and Kamdars employed on demonstration. A considerable demand for these has arisen among private persons, and arrangements will be made to print more copies to meet this demand. In Hoshangabad, in particular in the Seoni-Malwa Tahsil, *Purvi Maghai Til* has largely displaced the old variety and is found to give an increased profit of not less than Rs. 5 per acre. Already the area under this variety numbers thousands of acres and the Agricultural Associations in the district arrange for the distribution of its seed to whole villages where this crop is grown in order to prevent deterioration by cross fertilization with the old variety. The practice of sowing cotton, *juar* and *til* in lines has now been thoroughly established in Seoni and parts of the Hoshangabad Tahsil and is rapidly extending in the eastern part of the district. In Narsinghpur two Agricultural Unions were formed at Burman and Chhota Chhindwara, the former dealing with both kharif and rabi crops, and the latter confining itself mainly to testing varieties of wheat and gram. The Unions lease about 15 acres of land for demonstration, maintain their own ploughmen, and supply the necessary stock to work the plots. The Department supplies a trained Kamdar to supervise the work of each, and to carry out demonstrations approved by the Department at the desire of the members. This is a new departure and promises a satisfactory means of extending our demonstration work. The year was of importance to the Betul District from the opening of a new Government farm close to Betul, for testing new varieties of the staple crops of the district and producing pure seed of approved strains for dissemination in the district. An Agricultural Assistant has been posted to this district for the first time, and to start with he will both superintend the farm and also have charge of demonstration work in the district. An Agricultural Union has been formed to assist him. Already 22 malguzars have joined it, each member subscribing Rs. 20 a year. All these members have seed farms under the supervision of the Department. The Union pays for two Kamdars of its own, and one has been supplied to them by the Department. These Kamdars are stationed out at central places in the district. Programmes of demonstration are prepared at the meetings of the Union after discussion by the members, each stating what particular demonstration he desires to be carried out in his villages. It has not yet been possible to provide Chhindwara or Mandla districts with wholetime Agricultural Assistants, these districts being added to Seoni to form one circle with its head-quarters at Seoni. Hitherto the Saugor and Damoh districts have been practically left to themselves owing to the want of staff, but a start has been made in both districts since the close of the year. A new Agricultural Union was formed and made a good start at Amarwara in Chhindwara in which district the Union at Chaurai, formed two years ago, did good work during the year. In the Seoni district a new demonstration farm, directly under the Department, was started during the year close to the head-quarters of the district. Successful demonstrations were made here in the eradication of *kans* and *kunda* grasses by the monsoon plough, and the advantage of sowing cotton by a drill by comparison with the local method of broadcasting. In spite of the unfavourable season the drilled plots showed a considerable increase in the yield. The advance made in this direction in the Hoshangabad District has already been noticed, but progress has also been made in Jubbulpore, Narsinghpur, Chhindwara and Seoni, in all of which districts it is as novel as the method of transplanting rice in Chhattisgarh. Some little progress was made by the Agricultural Union already existing at Binaika in the Mandla District.

The Western Circle.

45. The Circle was formed half way through the year of the four districts of Berar, the Central Provinces Districts of Nimar and Wardha and the Warora Tahsil of Chanda, and includes practically the whole of the principal cotton areas of the provinces, with the exception of a part of the Nagpur District newly attached to the Agricultural College as a small demonstration circle. Mr. Ritchie was posted to the Circle as Deputy Director and has already done good work in the formation of Taluq Agricultural Associations in place of the more cumbersome District Associations. It is hoped that the members living in a smaller area will meet more frequently and take a keener interest in agricultural improvement. Mr. Clouston had started one at Khamgaon in the previous year and its great success in the very first year of its existence suggested the policy of starting one in every Taluq. This has been done in all except the Melghat Taluq. Undoubtedly great results may be hoped for from many of these associations, though no doubt some will certainly show less practical enthusiasm than others. Seven more Co-operative Agricultural Unions were registered during the year bringing the total in Berar to 11. There were also 19 unregistered Unions under trial and 71 seed farms primarily formed for the distribution of pure Rosea cotton seed. 1,553,000 lbs. of this seed were distributed from Seed Farms and Agricultural Unions and a good deal more from private farms unassisted by the Department. The great superiority of this variety, both in outturn and in ginning percentage over the local cotton previously grown, has now been universally demonstrated in Berar and its spread throughout the districts has been phenomenal. The use of copper sulphate to prevent smut in juar has been generally accepted. Raipur local ground-nut was tested in all the districts and results were received from 16 centres giving an average outturn of 1,604 lbs. valued at Rs. 80 per acre. The difficulty in procuring labour for its lifting will probably militate against extensive adoption of this variety which is ready for harvesting at the same time that cotton picking is in full swing; but an early variety known as "Small Japan" has been tested at Akola and found to give satisfactory results, the great advantage being that it is ready for lifting at the beginning of October when labour is not in great demand for other purposes. The Divisional meeting held at Akola in November 1914 was well attended and much practical work done in the various committees. Useful work was done by the Department in the Amraoti District in the capture of 54 heads of a herd of cattle which had become wild near Anjangaon in the Daryapur Taluq and had been doing considerable damage for years past. Of the captured animals 3 escaped, 5 were sold immediately and 5 died from self-inflicted injuries; the remaining 41 animals are doing very well on the Borgaon Breeding Farm, where they are being tamed with the view to their ultimate sale. Progress in Nimar has not been so well defined. Geographically it is rather unfortunately placed and so not readily supervised. It seems to me to be suffering at present from a want of clear lines of demonstration policy, and I will ask Mr. Ritchie to get to know the best cultivators in the northern half of the district, who have not as yet been brought into close touch with the Department. It is satisfactory, however, to record that an excellent start has been made in the formation of pig killing clubs, wild pig being particularly destructive of the crops in this district. Tahsil Associations were formed in the three tahsils of the Wardha district and in Warora.

PART V.—AGRICULTURAL ENGINEERING.

46. The Department is still without the services of an Agricultural Engineer, but the introduction of various plant for agricultural power and of improved implements is being extended by the activities of the Department so rapidly that it will shortly be necessary to ask for the services of a special engineer. Meanwhile a great deal is being done to extend the use of the smaller improved implements by the firms of Messrs. Burn & Company and Messrs. Octavius Steel & Company. The Department continued actively to assist in the dissemination of these improved implements, which were sold to the value of Rs. 5,839 at the Adhartal Farm in the Northern Circle, Rs. 5,432 at the Sindewahi Farm in the Southern Circle, Rs. 4,668 at the Akola Farm in the Western Circle, nearly Rs. 4,000 worth through private agencies in Berar, Rs. 1,521 at the Raipur Farm, and a large number for which the price has not

been given at the Powarkhera and Tharsa Farms in the Northern and Southern Circles respectively. Numerous types of implements were tried in the Northern and Southern Circles with varying success. In this connection I have to bring particularly to notice the valuable assistance given to the Department by Mr. E. Cove, Head Master of the School of Handicrafts at Nagpur, whose ingenuity and keen interest have already produced machines which are being tested and are likely to prove so successful that the Department will recommend their adoption, in which case his services would be recommended for special reward.

PART VI.—PUBLICATION AND DISSEMINATION AGRICULTURAL INFORMATION.

Agricultural and Co-operative Gazette.

47. The *Agricultural and Co-operative Gazette* continued to be published during the year. The number of copies in circulation has during the year decreased from 5,922 to 5,912 of which 3,330 were Hindi, 2,127 Marathi and 455 English.

The decrease is insignificant.

Cotton Returns.

48. The weekly cotton returns continued to be collected and circulated during the year. The thanks of the Department are due to the Press and Mill Managers and to Cotton Market Committees for their cordial help and co-operation.

PART VII.—MISCELLANEOUS.

Central Museum, Nagpur.

49. Improvements in the Museum noted upon last year were continued during the year under report thanks to the zeal and energy of Mr. Graham, the Curator, and Mr. D'Abreu, the Assistant Curator, but much further improvement cannot be expected until very extensive alterations and additions to the building have been made. Though these have been approved by the Administration, the work cannot be taken in hand owing to paucity of funds. This is one of numerous good works which has had to be postponed till better times after the end of the Great War. Till then, the replacement of the Industrial Section by an Ethnological collection and the systematic arrangement of the Ethnological exhibits will have to be held over. The idea of making a collection of Ethnological exhibits had its origin in a request received from the British Museum of London to be supplied with some typical exhibits peculiar to the various tribes, races and castes of the Central Provinces. A fine collection representative of the aboriginal tribes was made in duplicate under the direction of Rai Bahadur Hiralal, Extra-Assistant Commissioner, Chhindwara. One set was sent to the British Museum and gratefully acknowledged by Sir C. H. Reid who has promised to write later at length "in connection with the specimens and the very valuable monograph that accompanied them." Mr. M. A. Suboor, Clerk of the Museum, has undertaken to catalogue the Muhammadan coins and has nearly finished those of the Moghal period. A considerable number of birds and mammals were added to the Natural History Section. Five different kinds of snakes were added to the Vivaria, three of which have laid eggs in captivity. The average number of visitors to the Central Museum fell to 277 persons per diem owing to the serious outbreak of plague in Nagpur during the year.

50. The Raipur Museum continued to attract the public of Chhattisgarh and was visited by no less than 97,393 persons during the year. The Weaving School attached to this Museum did some useful work. It has now been taken under the supervision of the Textile Expert.

The Maharajbagh Menagerie.

51. Since last year certain structural improvements have been carried out in the Menagerie. The tiger-house has been extended by the addition of two outside exercising yards, and the inner portion has been much improved. There are now four large cages and four dens. An upper cage has been added to the bear pit, additional shade

provided to the aviary, the main water gate in the large paddock reconstructed, a store godown completed, and quarters constructed for the Veterinary Assistant in charge. Refencing of the small deer paddocks was proceeding at the close of the year. The provision of a new monkey-house and conversion of the existing one to cages for small carnivora were postponed owing to want of funds, but the former will be partly constructed in the current year. The health of the animals and birds was mostly excellent throughout the year. Welcome additions were presented and in particular thanks are due to the Diwan of the Bastar State for the handsome gift of a fine tiger as well as a civet cat and numerous birds, and also to the Bengal-Nagpur Railway authorities for generously giving free transport over their lines for animals presented.

NOTICE OF OFFICIALS AND NON-OFFICIALS.

52. Now that the Hon'ble Mr. C. E. Low, I.C.S., C.I.E., has finally severed his connection with the Department of Agriculture in these Provinces, I am confident that I voice the sentiments of all officers in the Department, and of the thousands who are aware how greatly they have been benefited by its activities, in expressing their deep indebtedness to him for the whole-hearted and extremely competent way in which he built up the service and guided its energies, bringing it to the front rank of Departments of Agriculture in British India. A common popular fallacy is that a thoroughly good officer is "a difficult man to follow." Difficult only if his successor hopes to emulate or eclipse his achievements; otherwise easy by reason of the efficient state in which he leaves his charge: and such has been my fortunate experience as Mr. Low's successor.

53. I cannot exaggerate my obligations to the Deputy Directors. Messrs. Clouston and Evans have fully maintained their already high reputations, and it is almost superfluous for me to bring their great services again to notice. I am deeply indebted to Mr. Allan for his invaluable help in getting the educational reform of the Nagpur Agricultural College carried through. Mr. Plymen left for Europe on leave shortly after I took over the Department and in the nature of things a great deal of the best work done by the Agricultural Chemist and Economic Botanist must be done without the knowledge, or at any rate the understanding, of a lay Director. But I have seen enough of Mr. Graham, the Economic Botanist, to appreciate how greatly he adds to the progress of the Department in the Central Provinces. Mr. Ritchie only took charge of the newly formed Western Circle in January of this year, but already he has thrown himself energetically into its advancement, and shown that he is fit to take a place amongst our very competent set of officers. To all these officers, in particular to Messrs. Clouston, Evans and Allan, I have had frequently to turn for advice which has always been given ungrudgingly and the best possible. Mr. Harvey, Assistant Director, has made a promising start in spite of poor health. I was very sorry to lose the services of Mr. E. C. Gibson, I.C.S.: he had already picked up much of the details of work and cordially identified himself with the department.

54. Rai Sahibs Tundilal and Bhaiyalal Dube and Mr. Nandkishore have continued to do excellent work as Extra-Assistant Directors. The services of Mr. Kalka Prasad Shrivastava, as Superintennent of the Nagpur Agricultural College Hostel and as Lecturer on Botany, have already been noticed. He also did useful research work and his promotion to the Provincial Service has been thoroughly well earned. Mr. A. R. Padmanabha Iyer has efficiently carried on the work of Agricultural Chemist since Mr. Plymen went on leave.

55. The following Agricultural Assistants have been favourably noticed by their respective superior officers:—

Jiya Lal Tiwari, Shaikh Lal Muhammad, Govind Pershad, Lakshmi Narayan Dube, G. K. Kelkar, Narayan Ganesh Bhoot, Trimbak K. Ghatpande, V. R. Roy, N. G. Sule, Madho Parshad Dube, G. D. Mehta, G. M. Joshi, G. V. Bapat, N. K. Pendse, J. V. Takle, H. R. Shimogi, Balak Das Malvie, Kartar Singh, and Sharda Prasad Thapak. Also P. S. Shukla, Veterinary Assistant, Nagpur Menagerie.

56. Of others Mr. Evans writes "the list of names I would like to mention is too long for the space permitted." Special thanks are rendered to Messrs. R. A. B. Chapman, Rustomji Faridoonji, H. F. E. Bell, K. S. Jatar and G. A. Khan, Deputy Commissioners, K. S. Wali Muhammad, Manzur Ahmad and S. Mehr Ali, Extra-Assistant Commissioners, and to Messrs. Gokul Prasad, Abdul Hamid, Maqbul Husain, Timothy, Krishna Sewak, V. B. Kshirsagar, Abdur Rahim Khan and R. G. Utgikar, Tahsildars.

NON-OFFICIALS.

Mr. J. McGlashan, Chanda District; Diwan Bahadur Biharilall Khazanchi, Jubbulpore and Mr. Shyam Sundar Bhargava, his son; Seth Harishankar of Harda; Pandit Hardayal of Binaika, Mandla; Rai Sahib Daji Govind Dongre of Palsud, Govind Rao, his grandson; Thakur Kishor Singh of Jaswari, Nimar; Mr. V. G. Kulkarni of Gaigaon, Berar; Mr. K. G. Deshmukh of Khamgaon, Berar; Mr. P. R. Deshpande of Sindi, Wardha; Mr. Anand Rao Meghe of Borgaon, Wardha.

C. G. LEFTWICH,

Director of Agriculture and Industries,

Central Provinces and Berar.

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